A GIS-Based Examination of Residential Dwelling Figures in Newcastle-upon-Tyne: Comparison of the 1991 Census and the Local Authority Housing Data

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Abstract

The study compares the total number of dwellings in Newcastle-upon-Tyne according to the 1991 Census and the local authority Housing Department. This is to assess whether the explanation of the differences at the local scale, can contribute to the understanding of Census underenumeration at the national scale. The significance of dwelling figures is established by reference to Census underenumeration, the Estimating with Confidence (EwC) project, housing need and government finance. The study also draws on literature about GIS in local government in order to highlight the need for the local analysis of dwelling figures for research and policy purposes, and to demonstrate the benefits of integrating Census and local authority data.

The study describes the processes of data collection, integration and interpretation from both the Census and local authority sources. Total residential dwellings, occupied council stock and total vacant dwellings from both sources are compared and the differences are standardised. The standardised differences are then mapped (using z-scores) at the District scale and at Housing Area, Housing Neighbourhood, Ward and ED resolutions. Areas with large differences above or below the expected differences are highlighted and their characteristics are noted. The observed differences are then correlated with some of the characteristic of the areas in the form of dwelling structure, tenure, imputed residents and accommodation not used as main residence. These characteristics are then compared with those of areas with EwC non-response adjustment figures. The correlation analysis is carried out at two scales with the same resolution. This includes all the EDs in the City, then focuses on the EDs within Benwell and Scotswood Wards. This is to highlight the significant associations, specific to these Wards. Benwell and Scotswood are selected because of their patterns of vacancy differences, which are found to be in contrast to the city-wide pattern. The Census excess of vacancies in these Wards are also found to be greater than those in other Wards and greater (more than 1.4 standard deviations) than the city-wide expected average difference. The correlation analysis at the City scale finds that EDs with higher Census vacancy counts than the local authority data, share similar characteristics with EDs containing high EwC non-response adjustment figures. These are EDs with greater number of flats in residential buildings and local authority rented dwellings. In Benwell and Scotswood this pattern changes to greater number of flats in

commercial buildings, converted flats and privately rented dwellings. The last stage of the study explains the differences in the selected variables using the individual property records (ED profiles). The study finds that at District (City) scale, the Census counts of total residential dwellings and occupied council stock are slightly higher than those from the local authority data. The Census vacancy figures however, are significantly less than local authority figures, mainly due to definitional differences and data collection methods used. The opposite pattern of higher Census vacancy figures is observed in Benwell and Scotswood. The reason for this is found to be due to vacant dwellings awaiting demolition, which were included in the 1991 Census vacancy figures but not in the local authority datasets. An example of how different definitions and data collection methods caused the observed differences.

The study illustrates that the comparison of local authority and Census data can highlight areas with large differences (in vacant, occupied council stock or total residential dwelling counts) through data standardisation. The characteristics of these areas are found to be similar to those of areas reported as difficult to enumerate, in the national studies of Census underenumeration. The study also illustrates that these differences can be associated with Census non-response and may be incorporated, as indicators of difficult to enumerate areas, in such indices as the 'Hard to Count Index' used in the 2001 Census. As well as Census research, these findings would be beneficial in data interpretations, used as the basis for policy making processes.

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Abbreviations

BURISA	British Urban and Regional Information Systems Association
CPD	Central Postcode Directory
CPM	Central Property Module
CVS	Census Validation Survey
DoE	Department of the Environment
DETR	Department for the Environment, Transport and the Regions (previously the DoE)
DTLR	Department of Transport, Local Government and the Regions (previously the DETR)
DSS	Department of Social Security
ED	Enumeration District
EHCS	English House Condition Survey
EoT	End of Tenancy
ERB	Enumeration Record Book
ESRC	Economic and Social Research Council
EwC	Estimating with Confidence
GIS	Geographic Information Systems
GRO(s)	General Registration Office(s)
HIPs	Housing Investment Programmes
HPIS	Housing Property Information System
LARIA	Local Authorities Research and Intelligence Association
LBS	Local Based Statistics
LGMB	Local Government Management Board
LPG	Land and Property Gazetteer
MIDAS	Manchester Information, Datasets and Associated Services
NDHS	National Dwelling and Household Survey
NHS	National Health Service
NLIS	National Land Information Systems
NLUD	National Land Use Database
ONS	Office of National Statistics (formerly OPCS)
OPCS	Office of Population Censuses and Surveys
OS	Ordnance Survey
PAF	Postcode Address File
PCVS	Post Census Vacancy Survey
SAS	Small Area Statistics
SLA	Service Level Agreement
TWRIU	Tyne and Wear Research and Intelligence Unit
UK	United Kingdom
UPRN	Unique Property Reference Number
US	United States

Chapter 1 Introduction

Chapter Overview

This chapter introduces the range of topics that form the background to this study. A summary of the previous research highlights gaps in the overall field of study and develops the research problem of Census underenumeration of dwellings (Section 1.1). The research aims are listed in section 1.2. The justification for the thesis is explained in the context of previous research in section 1.3 and a summary of the methodology is provided in section 1.4. The outline of the thesis is described in section 1.5 and the limitations are listed in section 1.6. The conclusions derived from this chapter are set out in section 1.7.

1.1 Local authority data, the Census and problems of underenumeration

The first question in the first ever British Census in 1801 was about the number of houses (Lucas, 1967). Since then, the relationship between the number of people and the number of 'dwellings' has continued to be an issue of considerable interest to government. Modern Census data is used by central government in the assessment of financial resources distributed to local authorities (Hall and Hall, 1995; DuBock and Mennell, 1994). In 1991, the Census missed around 1.2 million residents (OPCS/GRO(S), 1994), which generated a vast amount of literature that not only discusses the reasons for this underenumeration (Heady et al., 1994; Heady et al., 1996) but also highlights the concerns about its implications (Simpson and Dorling, 1994; Hall and Hall, 1995). The findings were first reported after the Census figures were compared to the mid-1991 population estimates and the reasons were investigated through the subsequent Census Validation Survey (CVS). Failure to identify residential dwellings and the misclassification of accommodation were identified among the many reasons for this underenumeration (OPCS/GRO(S), 1994). The original 1991 Census figures were adjusted by the OPCS, using the results of the CVS, the mid-year population estimates and local administrative records. These adjustments were then allocated to local authority districts. The Estimating with Confidence (EwC) project continued the work carried out by the OPCS and allocated district adjustments to Wards and EDs. The EwC project started in 1991 and was prompted by local authorities' concerns about the implications of Census underenumeration at local scales. The project aimed to use the 1991 Census results to assess the accuracy of the population estimates during the 1980's (Simpson, 1992).

As part of this project, local authorities were consulted to provide as much local information as possible (Simpson *et al.*, 1995). The results were sub-district adjustments, including adjustments due to dwelling related errors, which were recognised by the OPCS and named as 'Gold Standards' (Tye, 1996a). The significance of dwelling figures is also highlighted in literature covering housing need estimates. Census data is used by the Central Government to assess national housing need estimates (Niner, 1989; Niner and Maclennan, 1990; Wilcox, 1990; Whitehead & Kleinman, 1992) and by local authority housing departments, to prepare bids for funding from the central government (Audit Commission, 1993; Blackman, 1995; Hall and Hall, 1995; DETR, 1998b). Other than the Census, sources of national dwelling figures include the English House Condition Survey (EHCS), the National Dwelling and Household Survey (NDHS), both published by the then Department of the Environment, Transport and the Regions (DETR) and the Housing Strategy and Investment Programme (HIPs) returns made by the local authorities. The housing need estimates are compiled in various ways depending on the purposes of the organisations involved. At the District scale, exclusion of vacant dwellings for example, can result in inconsistencies between the national and local estimates of housing need. Niner (1989) in her assessment of housing need estimation methods, highlights regional differences in the nature of housing need. The concern about national versus local estimates, has also been expressed in the 1996 investigations of the House of Commons into housing (HMSO, 1996).

Dwelling counts are not only important at the national scale, but also at the local scale. Simpson and Dorling (1994) expressed concerns regarding the implications of Census underenumeration on local housing need estimates. The authors noted that in 1991, the Census total dwelling figures were much greater than expected by the DETR and that this resulted in the 'sudden upwards revision of official estimates of the dwelling stock'. In addition, the DETR's estimates of vacant dwelling counts were revised downward for April 1991. Simpson and Dorling emphasised the effect of Census underenumeration of households on vacant dwelling figures and illustrated how 'even a small estimate (1.8 percent) of the national non-response of households can translate into a 71 percent overcount of vacant dwellings and thus have a dramatic effect on national housing debates'. The authors continued to question vacant dwelling counts

and pointed to the results of the 1991 Post Census Survey of Vacant Property (PCVS) in Scotland which suggested 9% of all properties classified as vacant in the 1991 Census were in fact occupied. This survey illustrated that examining vacant dwelling figures at the local scale can be used to contribute to the understanding of Census underenumeration at the national scale. One of the final conclusions of Simpson and Dorling was that 'more faith should be placed in the DETR figures than the raw census counts' (Simpson and Dorling, 1994).

Local authority administrative data play an equally significant role in decision-making processes in a range of policy areas central to the role of local government. The potential benefits of local authority data for both policy (Coombs and Raybould, 1990; Higgs, 1994; Flowerdew, 1995; Bourne, 1996) and research purposes (Simpson, 1993) have been acknowledged, but remain relatively unexplored (Openshaw, 1991; Higgs, 1994; Smith, 1998). Spatial analysis of this data has been made particularly difficult, mainly due to the problems of implementing Geographic Information Systems (GIS) in local authorities (Bromley and Selman, 1993; Masser and Campbell, 1994; Peel and Davies, 1997).

1.2 Research Aims

The original aim of the thesis was to undertake a GIS-based examination of the extent of errors related to the enumeration of dwellings in Newcastle-upon-Tyne by comparing Census and local authority data. As the thesis progressed and the differences between the definitions used by these data sources became apparent, the study focused on explaining the differences between Census dwelling counts and closely matching figures, constructed from the local authority data. The study assessed whether the explanation of the differences between Census and local authority dwelling figures at the local scale, could contribute to the understanding of Census underenumeration at the national scale. This was achieved though four objectives:

1. Exploration of the methods of data integration, which involved identifying relevant data sources, resolving definitions, georeferencing and documenting the difficulties encountered.

2. Data interpretation, which involved the identification of comparable variables and the construction of comparable figures from the local authority and the 1991 Census.

3. The exploration of the differences in Address/dwelling counts (including vacancies) from local authority and Census sources, for evidence of errors in the Census enumeration process. This is carried out through investigating the geographical distribution of the observed patterns at the District scale and at increasing resolution: Housing Area, Housing Neighbourhood, Ward and ED, and relating the findings to dwelling type, tenure and occupancy. This also assesses the reliability of the information provided by both data sources at the local scale.

4. Investigating the findings in conjunction with data from previous research carried out as part of the EwC project.

1.3 The importance of Census dwelling figures

The review of the literature topics introduced above, identified five areas in which a better understanding of dwelling counts at the local scale might contribute to more effective public policy.

The use of local authority data in assessing census underenumeration

After the publication of 2001 Census results some authorities found discrepancies between these and the 2001 mid-year population estimates, which were based on the 1991 Census. The authorities included Westminster and Manchester City Councils, which claimed 26% and 11% of the population in their respective boroughs were missed by the 2001 Census (Milward, 2002a). The authorities' concerns regarding these low population figures and the implications for their funding from the Central Government led to a formal challenge of the ONS figures. Westminster Council formally asked the Government for an independent review of the 2001 Census population figures (Milward, 2002b). Manchester and Westminster City Councils and the ONS are now in the process of comparing Census and the authorities' own

property records in an effort to estimate the level of Census underenumeration in each of their respective boroughs (ONS, 2003; Milward, 2002b).

Discrepancies such as those found between the 2001 Census and the 2001 mid-year estimates are not uncommon. The ONS uses the Census to re-calibrate the annual 'rolled forward' population estimates (Chapter 2 – Section 2.4.2). In 1991, similar discrepancies were found and the 1991 Census figures were adjusted to include 1.2 million missing residents (Chapter 2 – Section 2.4.4). The concerns regarding the implications for local government funding (Chapter 2 – Section 2.4.1) have also been widely discussed (Simpson and Dorling, 1994; Hall and Hall, 1995). The availability of machine readable local authority administrative data and technological advances in GIS have now contributed to the expectation that this administrative data might have further practical use, including their use for census checking procedures. This potential was noted a decade ago (Simpson, 1993).

Analyses such as that presented here are clearly of potential financial importance to local authorities. The results of the present study will show that the necessary comparisons between Census and local authority data are not easily made. Furthermore, the study will serve as an illustration of the kind of questions and the difficulties that are likely to arise when comparisons are made between the Census and local authority data. The present study demonstrates why the discrepancies between figures relating to inherently different entities, such as the Census dwelling figures and the local authority property/address records, can not be associated to Census underenumaration. Furthermore, the study illustrates why the efforts to construct comparable figures for 'like-with-like' comparisons do not always yield conclusive results.

The aim of comparing objects such as addresses and dwellings, which at first glance may seem similar, is likely to be hindered because of the different definitions used by the Census and local authority data. This became apparent during the present study's data interpretation process (Chapter 4). For example a number of individual addresses in a building, recorded as such by the local authority, were treated as a single shared dwelling or a communal establishment under the Census definitions. Hence, giving the

impression that the Census undercounted addresses. Another example, found in the present study, was the number of vacancies. The local authority did not record addresses of those properties due for demolition, while the Census considered these as vacant (Chapter 6).

The use of dwelling figures in the derivation of the Census adjustment figures

OPCS adjusted the original 1991 Census figures and allocated them to local authority districts. Further adjustments to Wards and EDs were carried out as part of the Estimating with Confidence (EwC) project. The numbers of under-enumerated residents due to dwelling related errors were allocated to districts using shared or converted dwelling numbers in each district and using imputed residents and unemployed 20-34 year old males, in each small area. The selection of indicators was through consultations with various local authorities and not 'based on hard evidence from the Census Validation Survey or from local demographic checks' (Tye, 1996b).

The need for the local investigation of dwelling figures

Concerns have been raised about the simplicity of the basis for the current methods of assessing housing need, the number of households minus the number of dwellings (Simpson and Dorling, 1994). Furthermore, there are concerns about the total number of dwellings used in this method, that may include or exclude components such as concealed households, vacant dwellings, and dwellings that are under improvement, hence producing various results (Whitehead & Kleinman, 1992). Apart from questioning the methods of calculating housing need at the national scale, there are concerns about the differences between these and the local estimates (Niner, 1989; Dorling, 1993).

Potential benefits of local authority administrative data for research purposes

In response to the concerns around the 1991 Census underenumeration, OPCS considered the use of administrative records to improve coverage of the 2001 Census. These included NHS, Council Tax and DSS registers, which could have been used at the aggregate level to 'aid census data quality monitoring, even if the register data initially relates to an earlier time period' (OPCS/GRO(S), 1996). In addition, OPCS considered reviewing the definitions of household and dwellings and using addresses or delivery points, in preparation for the 2001 Census. This followed the evidence

presented in the CVS regarding the enumerators' difficulties in 'identifying households and dwellings in multi-occupied buildings' (OPCS/GRO(S), 1995b, 12). For the 2001 Census, the enumerators were provided with a list from Address-Point address register, to help them identify dwellings. The definition of a dwelling was also reviewed and changed.

Potential benefits of local authority administrative data for policy purposes

As well as Census preparatory work, there are potential benefits of combining administrative local authority records with Census data for policy purposes. These have been discussed in literature on the use of GIS in local government and housing departments in particular. The lack of research in this area has been highlighted by Higgs (1994) noting that the majority of the literature has been concerned with 'operational management applications of GIS in housing rather than spatial data analysis for policy purposes'. The author suggests several areas of research in housing studies where GIS technology is perceived to be beneficial, all of which involve combining various local authority datasets in order to explore spatial patterns and identify relationships between variables.

Other studies have highlighted the benefits of combining Census and local authority data

A number of studies have advocated the combination of Census and local authority data in both UK (Flowerdew, 1996; Charlton *et al.*, 1995) and overseas (Gerland, 1996; Saarenvirta, 1998; Judson and Popoff, 1997). An example of combining local authority data with Census data has been demonstrated by Martin and Higgs (1995), in a study of the taxation regime in Cardiff. Part of this study focused on the comparison of detailed datasets during which the authors compared the Census household figures to property counts from Address-Point for EDs. The authors noted that the large discrepancies between these figures could have been because 'the census has under-predicted counts as a result of underenumeration in the census' (Martin and Higgs, 1995). They also referred to the evidence in the research by Simpson and Dorling (1994), highlighting the significance of non-registration for the community charge in deprived Wards. They continued to say that 'the significance of this factor can not be estimated for the present study without recourse to in-depth analysis of the situation in

the Inner Area of Cardiff' (Martin and Higgs, 1995). The present study focuses on explaining differences between the Census and local authority dwelling figures. The local authority figures are obtained from the authority's Housing Department, the planning gazetteer and the 1991 Community Charge records. The differences are explained considering the definitions and the purposes for data collection. In addition, evidence of missed or misclassified accommodation by the Census is sought to test these national reasons for Census underenumeration of residents, at the local scale. This also assesses the usefulness of local authority data 'as a check on the census' (Simpson, 1993).

1.4 Methodology

1.4.1 Data integration: The identification of relevant data sources and resolving definitions

Data sources that included information about dwelling type, tenure and structure were identified. These included data, in both digital and manual formats, from Newcastle City Council and the Census tables. The local authority data included records of council stock, disposed/demolished properties, vacant properties, property gazetteers, locations of newly built sites (paper maps), Housing Annual reports and internal computer records. These were obtained from the Housing Department, Rates Section, IT Department and Planning Department of the authority. Census data was obtained from the 1991 Census Small Area Statistics (SAS) and Local Base Statistics (LBS) tables (Chapter 3 –Section 3.2.1 and Chapter 4 – Section 4.4). The identified data sources included definitions, which were suited to the purposes of the departments from which they originated. Understanding data collection purposes therefore, formed part of resolving these definitions with those in the Census tables (Chapter 3 - Sections 3.2.1 to 3.2.3). Shared dwellings for example, defined as such under the Census definitions, are referred to as Houses in Multiple Occupation by the local authority, the owners (and not the tenants) of which are liable for the payment of council tax. Records of these properties in the council tax database therefore, refer to each house and not to the constituent rooms/bedsits.

1.4.2 Data integration: Geo-referencing

Following the identification of relevant datasets, the study focused on the technical issues of data integration. These included geo-referencing and linking the datasets together, in preparation for use within GIS (Chapter 3 - Section 3.3). Integration and the interpretation of local authority data involved visiting the relevant departments and obtaining some insight into the data collection procedures, the network systems, the mainframes and the data updating procedures.

1.4.3 Data interpretation: Identification of comparable variables

Three variables within the identified data sources, and comparable to Census figures were identified (Chapter 4 – Section 4.2.1). These were vacant residential dwellings, occupied local authority rented dwellings and total residential dwellings. The construction of the figures for these variables involved the correct interpretation of the datasets. For example, the proportion of disposed/demolished council properties, which were to be included in the 1991 council stock counts, was determined using the end of tenancy dates. Another example was the exclusion of sheltered accommodation from the local authority counts of council stock, in order to create comparable figures to those from the Census tables. This process also referred to the information obtained about data collection and maintenance routines.

1.4.4 Explanation and the spatial distribution of differences

The differences in figures of vacant residential dwellings, total residential dwellings and occupied local authority rented dwellings, according to the two sources, are explained and their spatial patterns are described in Chapter 5. The differences were standardised and areas with large differences above or below the expected differences were highlighted through comparisons with the city-wide average difference. The expected differences were calculated as the city-wide difference distributed among areas, pro-rata to the proportion of Census vacant, occupied council stock or total residential dwelling counts. The standardised differences were then mapped (using z-scores) at the District scale and at Housing area, Housing Neighbourhood, Ward and

ED resolutions (Figure 1.1). The relationships between the observed differences and the area characteristics were explored using correlation analysis (Chapter 5 – Section 5.8). This was carried out at two scales with the same resolution, using all EDs in the City and those in Benwell and Scotswood Wards. The investigation focused on these Wards because of the large Census excess of vacancies found in these Wards. The actual reasons for the observed differences (in EDs within Benwell and Scotswood) were then sought in the last stage of the study, using the individual property records.

The terms scale and resolution are used throughout this study in a way which corresponds to the usage by Haggett *et al.* (1977) and Johnston *et al.* (2000). Haggett *et al.* use the word 'scale' to describe the dimensions of a study region, and exemplify this in terms of a Country (USA), a State (NY), a City (NY), or 'Central Park' (NY). In Johnson *et al,*. this is described as the 'geographical scale'. Haggett *et al.* refer to the size of the (data) 'collecting grid' at any one of these scales as 'spatial resolution', while Johnston *et al.* refer to this as the 'methodological scale'. In this study, the scales at which an analysis takes place may be those of the City, Housing Neighbourhood, or Ward. Within these units, the spatial resolution might be the Ward, the Enumeration District (ED), or the individual dwelling. Thus map labelled 'd)' in Figure 1.1 is at the City scale and Ward resolution.

1.5 Thesis Outline

The thesis includes eight chapters. Chapter 1 briefly introduces the literature that forms the background to the study. The main research problem is justified by reference to the neglected areas identified in the reviewed literature and states the aims and objectives. Chapter 2 reviews the literature introduced in Chapter 1 and through identifying the neglected areas of research, develops and focuses on the research problem of Census underenumeration of dwellings.

Chapter 3 describes the data integration process, involving the identification of data sources and highlighting the importance of definitions, geo-referencing techniques and the problems encountered. Chapter 4 focuses on data interpretation, identifying comparable variables, methods of aggregation and constructing comparable variables

from local authority and Census figures. Chapter 5 describes and explains the observed patterns of difference between local authority and Census figures at the District scale then at increasing resolution: Housing Area, Housing Neighbourhood, Ward and ED (Figure 1.1). In Chapter 6, the study focuses on explaining the differences in EDs within Benwell and Scotswood. Correlation analysis is carried out using all EDs in the City and those in Benwell and Scotswood Wards (two scales with the same resolution) in order to highlight any relationships present.

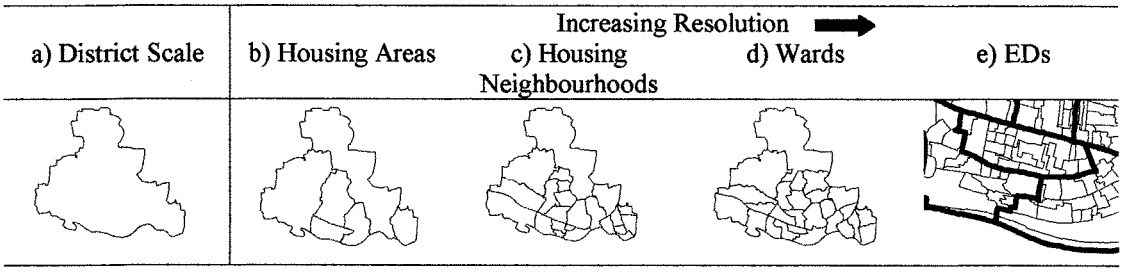

Figure 1.1 District, Housing Areas, Housing Neighbourhoods, Wards and ED boundaries

Chapter 7 discusses the findings of Chapters 3, 4, 5 and 6 individually in the context of literature reviewed in Chapter 2. Data integration, data interpretation and the problems encountered are discussed in the context of GIS in local authorities (Section 2.2.1) and housing departments (Section 2.2.2). The observed patterns and the implications of this are explained with reference to local government finance (Section 2.3), Census underenumeration (Section 2.4), Estimating with Confidence project (Section 2.5) and housing need estimates (Section 2.6). Chapter 8 considers the findings of Chapters 3, 4, 5 and 6 collectively and outlines the contributions to the understanding of Census underenumeration of dwellings in Newcastle-upon-Tyne (Figure 1.2). Additional details about the datasets and the analysis are included in appendices 1 to 11.

1.6 Limitations

A number of limitations are acknowledged in this thesis. Minor geo-referencing errors and errors in the EDLINE boundary shapefile were ignored. In the absence of datasets relating to 1991, other data relating to later time periods were used. Other limitations included the absence of detailed information about newly built properties and private sheltered accommodation. Despite these limitations, the assessment of the usefulness

of local authority datasets in Census undersenumeration research, formed part of the study. Datasets were selected depending on whether they were available for research, could be used to create comparable variables to Census variables, and could contribute to the understanding of Census underenumeration.

1.7 Conclusion

This chapter has briefly introduced the literature topics that form the background to the study. These included the 1991 Census underenumeration of residents, the adjustment processes by the OPCS and the 'Estimating with Confidence' project, housing need and government finance. The chapter highlighted concerns regarding the implications of Census underenumeration and the suggestions for further research involving the combination of Census and local authority data. The aims of the study have been stated and justified by reference to neglected areas within each topic. The thesis structure has been outlined and the limitations of the study listed and justified.

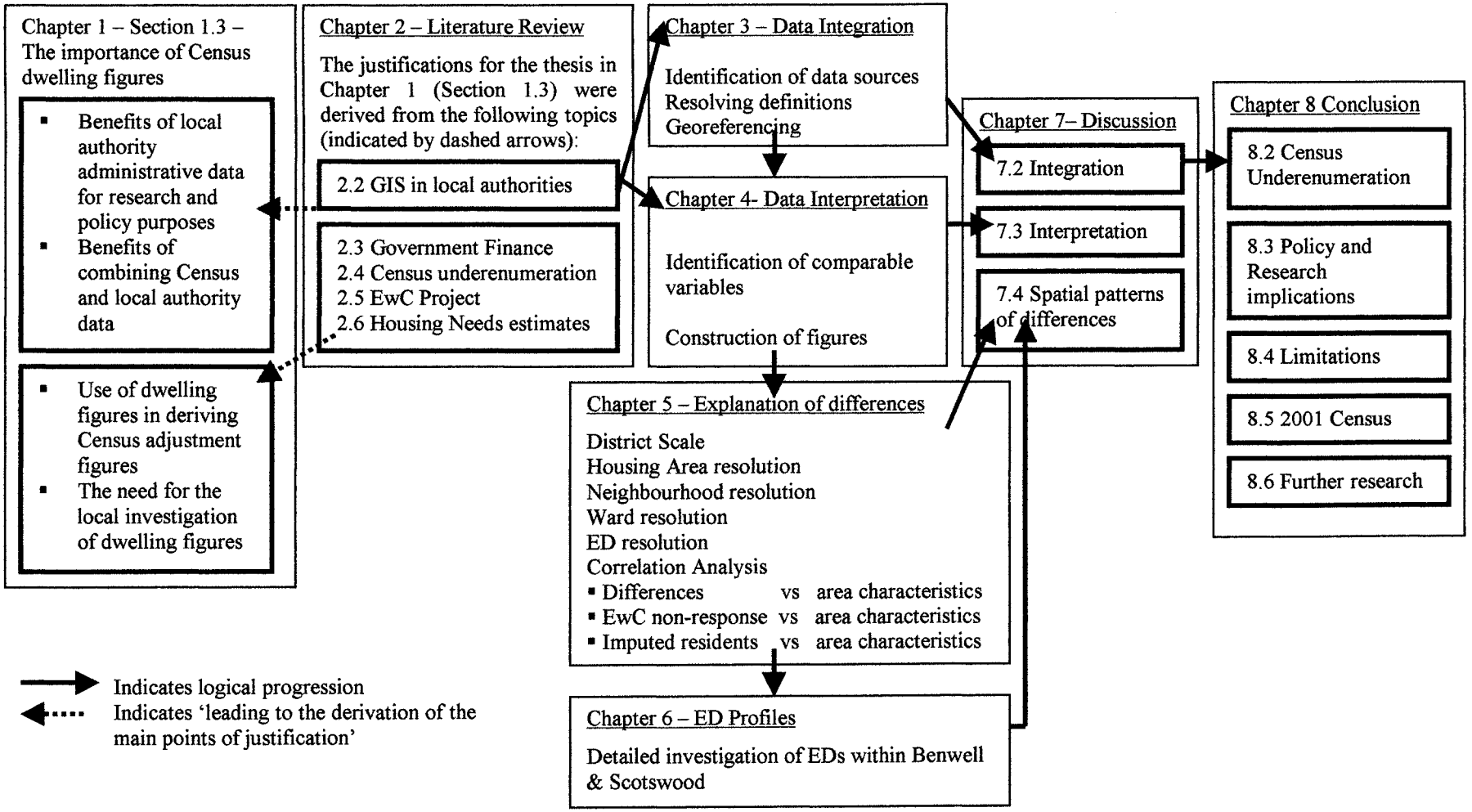

Figure 1.2 : Thesis Structure

Chapter 2 Literature Review

Chapter Overview

This chapter reviews the literature relating to several inter-related fields of research, forming the overall background to this study. Sections 2.2 to 2.5 provide background information on the topics of GIS in local authorities, government finance, Census underenumeration and Estimating with Confidence project. The significance of dwelling numbers are further emphasised in section 2.6, with reference to housing need estimates. Section 2.7 provides a summary, reiterating the main points of the chapter.

2.1 Introduction

Most local authority information relates to social, demographic and physical characteristics of geographical locations held in computer databases for administrative purposes (DoE, 1987). Answers to geographical questions relating to policy or administrative areas can be provided through linking the information in databases to maps and analysing the layers of data within Geographical Information Systems (GIS). For example, boundaries such as SRB regeneration areas can be digitised within GIS and used to identify properties that are to be targeted for regeneration. The following review begins by referring to literature relating to the use of GIS in British local government in recent years, with particular reference to the difficulties experienced during the implementation process. Difficulties such as these in Newcastle City Council, influenced data collection and data matching procedures carried out in this study. The review then focuses on the role of GIS in housing departments in particular, highlighting the value of research into analysis of administrative data in conjunction with the 1991 Census of population (Section 2.2). It has been suggested that the integration of information from housing departments and the 1991 Census can have significant benefits in the assessment of housing need and effective targeting of local authority resources (Higgs, 1994; Simpson, 1994). The importance of Census figures therefore, is explained in the wider context of central government grants to local authorities and in relation to housing bids for extra allocation of the Department of Transport, Local Government and the Regions (DTLR formerly the DETR) resources (Section 2.3).

The section describing the role of Census figures in government finance is followed by the review of literature covering the 1991 Census underenumeration of residents, and the description of OPCS's Census adjustment process (Section 2.4). The importance of Census underenumeration of dwellings is also highlighted in section 2.5 with reference to the 'Estimating with Confidence' (EwC) project, which distributed OPCS's district adjustments to Wards and EDs. the relatively little published literature on the subject of dwelling underenumeration is noted in Section 2.6. This section also presents some hypotheses about the similarities between areas with underenumerated dwellings and those with missing residents.

2.2 The significance of GIS

Problems of data integration encountered in this study stemmed from wider organisational difficulties found to be common to most local authorities, involved in implementing a corporate GIS. The significance of GIS in the project is therefore established by reference to the development of GIS in local government in general and housing departments in particular, in recent years.

2.2.1 Development and applications of GIS in local government

Local authorities collect information, that is already spatially referenced[1] for their administrative functions. Recent technological advances in GIS have taken advantage of these existing referencing schemes, enabling the geo-referencing[2] of this rich source of information and the production of better-understood visual outputs. Although the potential benefits of GIS to local authorities have long been recognised in a wide range of literature (Bromley & Coulson 1989; Reeve & Wheeler, 1991; Rhind, 1991; Buxton 1991; Campbell and Masser, 1992), the introduction and implementation of GIS in British local authorities has been a relatively recent event. Campbell and Masser (1994) compared the findings of a telephone survey of GIS usage in 514 British local authorities (undertaken in summer 1993), with those of a similar survey in 1991. The comparisons revealed that the number of authorities with GIS facilities had increased

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[1] Includes data location, for example an Address, Postcode or grid co-ordinates
[2] The process of adding 'real world' grid co-ordinates to records within a dataset.

by more than 50% in just over two years. The survey also found that the number of authorities with no plans to introduce GIS had increased by 3.5%. The main reason given by these authorities was the Government's proposals for the reorganisation of local government and lack of finance. The majority of authorities with GIS facilities already in place were identified as those in the Shire counties (91.5%) and the Scottish regions (66.7%). Metropolitan districts formed the third largest section (49.3%) of all authorities with GIS facilities at the time of the survey. Three main problems with the implementation of a corporate GIS within a local authority, were identified from the reviewed literature. These were the neglect of the 'human environment', data ownership and cost. The first was explained as knowledge of 'the potential GIS users of varying readiness for GIS' (Bromley and Selman, 1993). The authors carried out a questionnaire survey of geographic information usage across all departments of West Glamorgan County Council. The survey's main focus was analysing the use of maps, map procedures and methods of exploring spatial relationships. Their research highlights:

'... the gulf of ignorance which seems to exist between the likely consumers of GIS and the suppliers. ... (The local authorities) are in a poor position to articulate their requirements. On the other hand the suppliers appear to lack the in-depth knowledge of the ways in which local authority staff handle geographical data.'

(Bromley and Selman, 1993)

The second problem was data ownership within local authorities (Radburn, 1999; Peel and Davies, 1997). This was highlighted by Peel and Davies (1997) when reporting on the progress and remaining complications of GIS implementation in local authorities during 96/97. They note:

'despite the fact that authority data is publicly funded and therefore should be available, data is often being protected by its 'owners'. Until this problem is resolved, GIS will never achieve the ultimate benefit of authority-wide access to information.'

(Peel and Davies, 1997)

The third pragmatic issue hindering the full implementation of GIS was that of the limited resources available within local authorities for costly corporate GIS software, hardware, user training and support (Peel, 1995; Hookham, 1994; Blackman *et al.*, 1994; Masser and Campbell, 1994). The routine and administrative nature of the tasks performed by these organisations has in some cases, provided little justification for them to undertake or commission GIS-based research (Blackman *et al*, 1994). As a result, data integration and spatial referencing have until recently remained low priority tasks, despite the extensive literature advocating GIS as the most appropriate framework for such tasks. Worrall (1992) notes:

'...In particular local government has not sought to add value to internally generated operational information by improving spatial referencing systems and adding management value to operational data by integrating disparate data sets'

(Worrall, 1992)

Blackman (1995) also notes that limited financial resources is a significant factor for most local authorities that hesitate in setting up a GIS system for the entire organisation. Individual departments within the organisation choose instead to acquire GIS according to their own needs, develop customised applications and conduct pilot projects. The value of a unified approach to GIS in many local authorities becomes apparent after these initial projects identify the true value of integrating disparate data sources (Blackman, 1995). The difficulties in GIS implementation included those brought about after the 1996 local government reorganisation. Many councils were abolished and new authorities were formed. These new authorities attempted to salvage GIS equipment, data and expertise from the councils that they replaced (Peel and Davies, 1997). One of their main tasks was to collate data of varied formats and to unify the range of differing systems inherited from their predecessor councils. Because of this, the availability and integration of disparate address-based data of varied formats have become issues of primary concern in recent years for local authorities engaged in the process of implementing an operational GIS system.

The need and importance of data integration within local authorities was further emphasised through the government's introduction of BS7666 part 2 (Land & Property

Gazetteer) and part 3 (Addresses) in June 1994 (Ireland, 1994). These were standards introduced in order to co-ordinate the local government's land and property computer registers. The standards also specified a standard format for address and property referencing and assigned a permanent unique property reference number (UPRN) to each identifiable property in Britain. These standards also formed the foundations for national databases such as the National Land and Property (NL&P) gazetteer, the National Land Use Database (NLUD), the National Land Information Systems (NLIS) and the National Geospatial Database (NGD) (Nanson *et al.*, 1996; Smith, 1996). In parallel with these efforts, Ordnance Survey's Address-Point was made available to all local authorities in 1996. This product (launched in April 1993) was based on the Post Office's Postcode Address File (PAF) and in compliance with the BS7666 standards. Grid references for each address derived from the Ordnance Survey's Land-Line maps and were provided to a 0.1m resolution.

The availability of Address-Point, the improved access to Ordnance Survey data and the developments in GIS implementation have facilitated a more efficient management of administrative information within local authorities. Some applications of GIS using local authority data have involved the analysis of patterns and trends, the production of performance indicators, the assessments of need and the analysis of data gathered from local surveys (Higgs, 1994). These new developments however, have highlighted many problems, including those associated with local authority data integration.

Longley *et al.* (1994) used several disparate databases held by Cardiff City Council in a case study to evaluate the taxation regime in Cardiff. The case study also illustrated some of the problems encountered when attempting to integrate disparate data sources into a GIS (Martin *et al.*, 1994). The datasets used included the domestic rates register, House price data, Community Charge register, Council Tax register, House Condition Survey and the Electoral register. Most of these registers included the postal address but very rarely the postcode. The registers were linked together using the UPRNs, comprising of codes for community, street and subdivisions of streets such as large blocks of flats and the address number. Direct address matching of these registers were found to be extremely problematic, because of the different address formats (address definition, punctuation and spelling). The case study illustrated the kinds of difficulties

inherent in defining a common spatial referencing scheme for disparate databases. The study also identified this as one of the remaining tasks faced by many local authorities on the route to full implementation of GIS.

2.2.2 The role of GIS in housing departments

Despite the vast amount of literature highlighting the potential for GIS in housing departments, few case studies include detailed demonstrations of the analytical functions of GIS in the housing policy context (Higgs, 1994). A review of the previously published literature, highlights the benefits of GIS technology in maintaining, integrating and analysing the vast amount of data held by the housing departments (Bourke, 1996; Bromley and Selman, 1993; LARIA, 1998; Rich, 1994). Access to computerised housing management information by housing decision-makers is in most cases required by geographical areas. Interrelating and analysing these partially geo-referenced datasets, can provide local authority policy-makers with up-to-date information for tasks such as housing needs assessments (Higgs, 1994) or monitoring the impacts of public resource allocations (Bromley and Selman, 1993) in local areas.

Another project focusing on the analytical techniques in GIS was a pilot project by Scottish Homes (Bourke, 1996; Bourke and Robertson, 1992). This was carried out in 1991 in order to investigate the use of spatially referenced housing data within their organisation. A corporate research database was constructed from a variety of sources such as housing surveys, Ordnance Survey maps, address codes and the 1991 Census. This database together with the housing research and other management tools, was utilised to illustrate the advantages of a corporate GIS system within Scottish Homes. Among the many benefits, the study noted the simultaneous interrogation of data collected at different spatial resolutions, the extra dimensions added to the analysis of data sets (value-added data) within GIS and the exploration of relationships not seen by conventional limited text-based systems (Bourke, 1996). Higgs (1994) also suggested several areas of research using GIS technology and housing data. These included the creation of a housing needs database, the analysis of vacancy patterns, debt recovery analysis and housing benefit analysis. Further suggestions included the

combination of datasets such as housing waiting lists, housing benefit and stock-condition information, as the basis for decision making by housing planners. It was further suggested that these datasets could be combined with Census data using the ED/Postcode directory. Further suggestions included the combination of data (using GIS) from housing and other departments of an authority, to higlight significant changes in local neighbourhoods. Blackman (1994) provides some examples of this:

'... changes in the number of benefit claimants in an area are likely to be related to changes in demands on social services; the level of property searches may indicate the level of activity in the local property market and so could be an indicator of wider economic conditions; and clusters of reported environmental health nuisances could indicate the existence of an underlying public health problem'.

(Blackman *et al.*, 1994)

The exchange of information between local housing authorities and other community related services was encouraged by the government in a Housing and Community Care guidance notice (DETR, 1998a) to local authorities. This has been part of the wider context of government strategy on improving the exchange of information between local authorities, central government and other government organisations (DoE, 1996; DETR, 1998a, DETR, 1999b; DETR, 2000b). Government publications have identified joint strategic planning and joint assessment as the key elements of delivering community care. In addition, the development of a special needs database was also recommended, which would be used to match individuals with special housing needs to suitable housing. Other suggestions have been the integration of housing information with the 1991 Census data. This would combine social and housing characteristics of an area and identify housing need for particular social groups. This could also assist the selection of areas for regeneration (Higgs, 1994). Worrall & Rao (1991) describe the derivation of a Local Needs Index (LNI) from Census variables, which could be used in conjunction with data on grant allocations and property information. This would identify 'priority social groups' in the targeting of resources. Policies can be assessed by monitoring the changes in the targeted areas which can assist in 'the more effective and efficient planning of improvement programmes' (Bromley & Coulson, 1991).

The potential value of integrating data from local housing authorities and the 1991 Census is also identified in literature surrounding the 1991 Census underenumeration (Section 2.4). It has been suggested that, 'the requirements for census coverage would be clarified through further research on the implications of non-response in 1991 in key policy areas including housing, unemployment and urban regeneration' (Simpson, 1994). OPCS (1996) has also suggested further research in the use of local authority administrative datasets as preparatory work toward the 2001 Census (assisting Census data quality monitoring).

2.3 The importance of Census in government finance

The use of indicators from the 1991 Census and the population estimates in government finance, emphasises the significant role of residents, households and dwelling figures. This section therefore, provides brief details of the central government's grant allocations to local authorities and the local authorities' housing bids to central government (Appendix 9 provides further details).

2.3.1 The use of Census figures in distribution of central government grants to local authorities

The decennial Census of population which has been the prime source of data about social and demographic characteristics of local areas, plays a significant role in the calculations of Standard Spending Assessment (SSA). The reliability of SSA formulae are assessed in regular meetings with local authority representatives and in most years these formulas have been changed (DETR, 1998b). More than half of the SSA total is accounted for by population factors, whether related to the total population in an area or a particular group (Hall & Hall, 1995; Bennett and Krebs, 1993). The Government develops separate formulae covering seven major service areas (Table 2.1), using relevant indicators of the characteristics of each authority. These indicators are from a wide range of sources including the 1991 Census, OPCS population estimates, the Earnings Survey and unemployment figures. As well as the use of population figures in grant allocations, the Government uses Census household and dwelling figures in

their housing need calculations. More details of the role of dwelling figures are included in section 2.6.

Service blocks used in the calculation of SSAs	Census Variable
1. Education Primary, Secondary, Post-16, Under 5, Other	Children of lone parents; Ward-based population density
2. Personal social Services Children, Elderly Residential, Elderly Domiciliary, Other	Children of lone parents, people living in shared accommodation; elderly living alone; birthplace of head of household; various physical characteristics of dwellings
3. Police	Not currently Census related
4. Fire & Civil defence	population
5. Highway Maintenance	working population
6. All other services Lower tier, Upper tier, Rent Allowance payments, Housing Benefit administration, Rail, Flood defence, Coast protection, National Parks, Interest receipts	working population, Ward density
7. (Capital financing is not Census dependent)	

Source: Adapted from Hall R. and Hall J. (1995)

Table 2.1 Components of Standard Spending Assessments (SSAs) related to the Census of population

2.3.2 The use of Census figures in preparing housing bids for extra allocation of central government resources

Housing is subject to a separate allocation process and is excluded from the major services mentioned above. The needs and resources for housing in a local authority area are described through both the Housing Strategy Statements (introduced in 1993) and Housing Investment Programmes (HIPs).

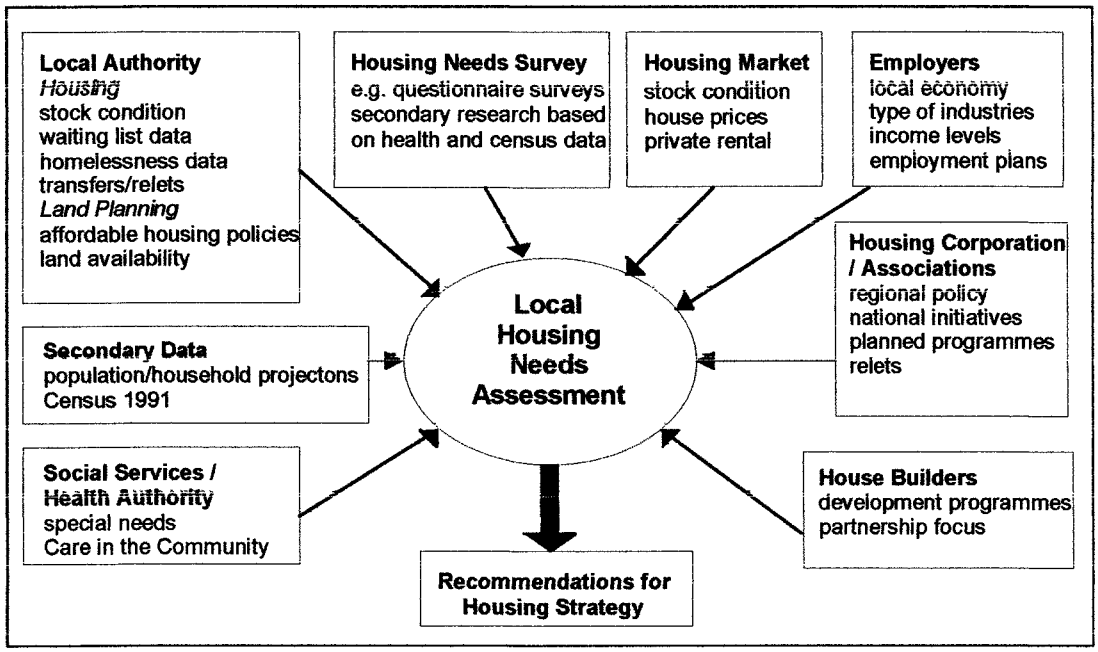

Figure 2.1 Sources of Information contributing to the assessment of housing need - Adapted from Zijl (1993)

HIPs are local authorities' bids for borrowing funds from the central government and are based on the need for investment identified in the strategy statement (Blackman, 1995). Local authorities use several sources of information including the 1991 Census in order to obtain a comprehensive view of the housing situation and assess the extent of housing need within their area (Figure 2.1):

'....where a local authority has undertaken a housing survey or carried out a particular study which reveals a need, for example, for special needs housing, this evidence of relative need can be used to argue the authority's case for an increased allocation of the HIP resources in that region. If there is no hard evidence, the DoE is not likely to treat the request seriously'

(Zijl, 1993)

The decennial Census of population has served as a particularly useful data source, as it provides the necessary information about the population structure at a small area scale.

2.4 Census underenumeration of residents: 'The missing million'

This section provides details of the 1991 Census underenumeration, Census checking procedures and the subsequent adjustments. This aims to highlight the characteristics of difficult to enumerate areas and dwelling related Census enumeration errors. The characteristics are then used to compare the areas more prone to Census underenumeration of residents with those that contained significant differences in dwelling figures. Information about dwelling related errors were also considered when explaining the differences in dwelling figures (Chapters 5 and 6). The discovery of Census underenumeration of 1.2 million (2.2%) residents came about as a result of the comparisons between the 1991 Census figures and the 1991 mid-year population estimates. Investigations by the OPCS revealed improbable sex ratios across England and Wales (Figure 2.2). This led to the conclusion that the Census underenumeration was concentrated among three main age groups: the young adults aged 20-34, (particularly males), infants and those aged 85 and over. Furthermore, this

underenumeration was estimated to be higher in Inner London and other metropolitan areas and cities (OPCS/GRO(S), 1994).

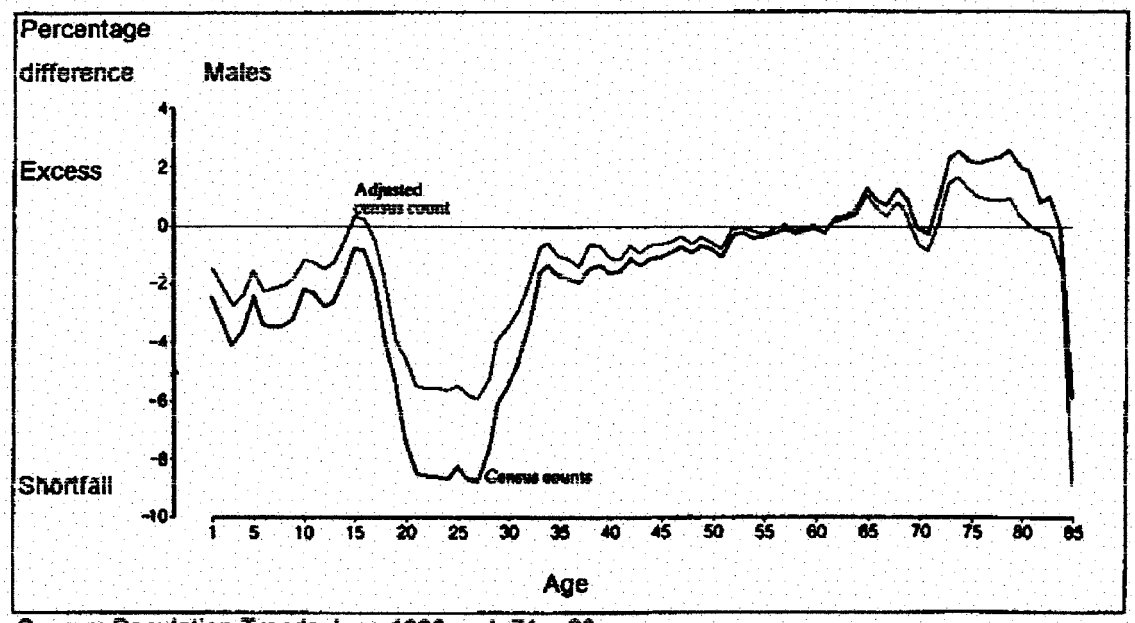

Figure 2.2 Comparison of male ratios from the 1991 Census data and the rolled forward estimates

OPCS issued three successive monitors for the mid-1991 estimates. Provisional estimates were provided in October 1992 (OPCS/GRO(S), 1992) and June 1993 (OPCS, 1993c), followed by the final estimate in August 1993 (OPCS, 1993d). OPCS concluded that the population estimates, that were based on the 1981 Census, were far more likely to reflect the 'true' population in 1991 than the raw Census counts (Heady et al., 1994; 1). Possible explanations for the Census under enumeration were given as:

- Errors in the 1981 Census (or the way the results were adjusted) which would affect the base of the rolled-forward estimates;
- Errors in rolling the estimates forward from the 1981 base;
- Errors in adjusting the 1991 Census counts; and
- Errors in the 1991 Census.

In clarifying the errors in the 1991 Census, OPCS suggested many reasons:

'..... there had been changes in society over ten years and possibly the social environment was different. For example, deference to authority has been said to have

decreased, there are more one-person households, more people unwilling to answer the door to strangers, there is more homelessness, and there had been concerns that the unpopularity of the community charge might affect the census, even though the two exercises were not connected in any way.'

(OPCS, 1993b)

and concluded that:

'Hitherto, the comparison of each census with its predecessor has been satisfactory and there has been no unexplained underenumeration. Why it occurred in 1991 is a matter for speculation. There is no conclusive evidence for any particular hypothesis'

(OPCS, 1993a)

The Census Offices reported the underenumeration as similar to that in other countries such as Australia, Canada and USA (OPCS/GRO(S), 1994), but considered the implications as insignificant (OPCS, 1993b; OPCS/GRO(S), 1995a). Other literature however, argued that the underenumeration in 1991 was much larger than experienced in the recent decades (Dale and Marsh, 1993; Openshaw, 1995) and have expressed concerns about the implications (Simpson & Dorling, 1994; Hall & Hall, 1995).

2.4.1 Implications of Census underenumeration

Simpson and Dorling (1994) addressed some of the implications of the 1991 Census underenumeration in a wide range of social applications. They suggested that the ambiguity surrounding the 1991 Census figures and in turn, the mid-year estimates, have had a consequential effect on the distribution of central government grants among local authorities. They also expressed concerns regarding the reliability of statistics based on the 1991 Census in applications such as; mortality rates, assessment of housing need, migration studies and survey sampling. Hall and Hall (1995) supported this argument and concluded that the incomplete population coverage of the 1991 Census 'could translate directly into a significant loss of that area's grant from central government's annually fixed spending in support of local government services' (Hall and Hall, 1995). Despite these concerns the consensus among some government departments is that the 1991 Census non-response is small enough to ignore.

Newcastle City Council's Research Section for example, was one local authority department that treated the 1991 Census underenumeration with some scepticism and did not use any of the available adjustments to the Census figures (Blackman, 1995; Stephens, 1997).

2.4.2 The 'rolled forward' mid-year estimates

The OPCS and the General Register Office (Scotland) produce annual mid-year population estimates for local authority and health authority areas, in the years between the Censuses. These are known as the 'rolled-forward' population estimates. The 1981-1991 mid-year estimates were obtained by the annual updating of the 1981 base counts of 'usual residents' with births, deaths, and net migration figures. Until 1991, the Census and its post enumeration survey were used to re-calibrate the 'rolled forward' population estimates and remove the accumulated errors. In 1991 however, the Census Offices adjusted the original 1991 Census figures, using both the 1991 mid-year population estimates and the Census Validation Survey (CVS).

2.4.3 The Census Validation Survey

The main evaluation of the 1991 Census coverage, was through the Census Validation Survey, which was carried out on a sample of 1200 Census EDs with approximately 240,000 households. This was carried out six weeks after the Census during June and July 1991 (Wiggins, 1993; OPCS/GRO(S), 1994). The objectives of the survey were to 'assess the success of the Census in identifying both **individuals** and various kinds of **residential units'** (OPCS & GRO(S), 1992). Some of the causes of underenumeration according to the CVS coverage report (OPCS/GRO(S), 1994) were identified as :

Errors in the coverage of households and accommodation

1. failure to identify all residential accommodation.
2. failure to identify all households and household spaces within multi-occupied accommodation. (e.g. tower blocks)
3. errors of double counting persons recorded as resident at more than one address.

4. misclassification of accommodation, for example classifying wholly absent households as vacant, or vacant as wholly absent household.

Errors in the coverage of individuals

5. failure to enumerate all persons present or resident within households and present in communal establishments.
6. errors in the estimates of numbers of persons in wholly absent households or in households where contact was not made.
7. errors of counting residents only as visitors.

Administrative errors

8. incorrect information supplied by form-fillers, including missed responses.
9. errors introduced when processing the forms, including the imputation of missing data.

The final mid 1991 population estimates included 440,000 missing persons identified by the CVS. These were grouped under four categories (OPCS, 1993d) in Table 2.2 (numbered 4 and 5). The missing persons were the result of one or more errors, listed above. There were 200,000 people recorded as 'visitors', but without a 'usual address' (error 7). The remaining 240,000 (numbered 5 in Table 2.2), formed only 20% of the total residents missed by the 1991 Census (OPCS, 1993a; Hall & Hall, 1995). These consisted of 178,000 missing persons, as a result of missed or misclassified dwellings (errors 1, 2 & 4), 177,000 persons not included in the Census but discovered by the CVS (error 5), and the over estimated 115,000 residents in absent households (errors 3 & 4).

2.4.4 Allocation of the 'missing million' to local authority districts by the OPCS

The 1991 Census figures were adjusted in three ways (OPCS, 1993d):

1. they were moved forward from Census day (21st April) to 30th June;
2. student numbers were transferred from home address to term time address;
3. an allowance was made for incomplete Census coverage

		thousands of persons
1991 Census count of usual residents for England and Wales		**49,890**
(a) Adjustment for definitional difference		**+54**
(1) Net student balance (the excess of students with term-time address in England and Wales over those with home address here)		
(b) Allowance for changes between census day and mid-1991		**+43**
(2)Natural change	+34	
(3)Net migration	+9	
(c) Allowance for census visitors omitted from usual resident count		**+200**
(4)Visitors with no, or no identifiable, usual address		
(d) Allowance for underenumeration in the Census		**+913**
(5)Census Validation Survey adjustment (other than included in (4) above)	+240	
(i)Over-imputation in processing	-115	
(ii)Net underenumeration arising from missed/misclassified dwellings	+178	
(iii)Net underenumeration of persons in responding households	+177	
(6)Enhancement of Census count of infants using data from birth and death registrations and migration indicators	+21	
(7)Enhancement of Census count of armed forces (and dependants of foreign forces) using MOD data		+42
(8)Modification of Census count of elderly residents using DSS pensioner data	+63	
(9)Enhancement of Census counts of people aged 1-44 to allow for underenumeration additional to (5)-(8)	+547	
Revised final rebased mid-1991 population estimate for England and Wales (Adjusted Census count)		**51,100**

Source: Adapted from OPCS (1993d)

Table 2.2 The steps in deriving the final 'all ages' mid-1991 population estimate for England and Wales from the Census count.

The following summarises these procedures as described in a number of publications (Heady *et al.*, 1994; OPCS, 1993d; Simpson & Dorling, 1994; Hall & Hall, 1995). The first adjustment (labelled b in Table 2.2) was carried out because the population estimates related to 30th June while the Census figures related to 21st April. The adjustment therefore, updated the Census figures with figures for births, deaths and migration in this time period. The information was derived from the registration of births and deaths and 'the results of the International Passenger Survey'[3] (Heady *et al.*, 1994). Definitional differences (labelled a in Table 2.2) included those concerned with

[3] A continuous sample survey carried out by the OPCS.

students' 'usual address'. The Census assumed this to be the home address, whereas the 1991 mid year population estimates used the students' term-time address.

The third adjustment was that named 'Allowance for underenumeration in the Census' (labelled d in Table 2.2), which included the underenumerated residents found by the CVS. This was initially distributed evenly throughout the country (June 1993), but in the final estimates (August 1993) this was allocated pro-rata to the age-sex distribution of the local authority districts (Heady *et al.*, 1994; OPCS, 1993d). The small size of the CVS sample however, did not allow for a direct allocation of CVS adjustments to local authority areas. The adjustments therefore, were initially allocated to larger areas and then to their constituent local authority areas. The larger areas were specifically devised for the distribution purposes and included inner London, outer London, main metropolitan areas, other metropolitan areas, non-metropolitan cities and other non-metropolitan areas (Heady *et al.*, 1994).

The underenumerated resident figures found by the CVS and related to over-imputation in processing (numbered 5i in Table 2.2) were allocated in proportion to the number of imputed residents in each local authority area. The net underenumeration of residents determined by the CVS and related to missed or misclassified addresses (numbered 5ii in Table 2.2) were allocated to local authority areas pro-rata to the number of shared or converted dwellings in each local authority. The Census figures for infants, armed forces and elderly people (numbered 6, 7 and 8 in Table 2.2), were adjusted using the information from the registration of births and infant deaths, Ministry of Defence and DSS pensioner records respectively. This was because the Census underenumeration affected the population subgroups and local authority areas differently. Alternative information from administration records was obtained to allocate the missing numbers to those specific subgroups wherever possible. The 'Enhancement of Census counts of people aged 1-44' (numbered 9 in Table 2.2) was carried out by allocating to the district, all but those aged 20-34. This was a pro-rata allocation to the same age categories in the district. Young adults aged 20-34 were the age group with the highest national level of underenumeration and were therefore allocated using an indicator. This indicator was determined as the difference between the expected and the actual Census sex ratio for broad area types. The allocation to

broad area types rather than local authorities was carried out in order to avoid the affects of local changes on sex ratios. These included changes in student numbers, relocation of army barracks or opening or closing of nurses accommodation. Investigating the OPCS adjustments therefore, determined that imputed residents and shared or converted dwellings were used in the allocation of missing residents. It was also found that residents were missed by both the Census and the CVS because of missed or misclassified dwellings. The adjustment process highlighted the role of local administrative data in updating the figures and further justified the investigation of local authority and Census data at the local scale.

2.5 Estimating with Confidence Project

2.5.1 Project Background

The comparison of local estimates with the OPCS's population estimates and the implications of Census underenumeration raised some concern by local authorities, which prompted efforts to extend the work carried out by the OPCS. The EwC project[4] began early in 1991 with two main objectives: assessment of the local authority produced population estimates through comparisons with the 1991 Census; and the comparison of such methods among local authorities. The project distributed OPCS's district adjustments of population estimates to Wards and EDs in England and Wales, and to postcode sectors in Scotland, using indicators from the Census SAS tables (OPCS/GRO(S), 1996; Simpson *et al.*, 1996). The final adjustments summed to the OPCS's district adjustments at each age and sex group. The resulting estimates were accepted by the OPCS and used as the basis for updating local population estimates through the 1990's (Simpson *et al.*, 1996). OPCS's district adjustments were grouped under five categories: student adjustments, Census day to mid-year timing adjustments, the armed forces adjustments, data modification adjustments and residual non-response adjustments. The following sections describe the methods of allocating non-response and student adjustments by the EwC project and Appendix 10 includes methods for the remaining categories. The role of Census dwelling figures, dwelling related errors and

[4] The project was completed as part of the ESRC's Analysis of Large and Complex Datasets program (Simpson, 1994). This was sponsored by the Local Authorities Research and Intelligence Association (LARIA), the British Urban and Regional Information

imputed residents in the adjustment process is established in order to highlighted the characteristics of areas, that were more susceptible to Census underenumeration. These characteristics were then used in the final explanations of differences between local authority and Census dwelling figures (the correlation analysis in Chapter 5, sections 5.8 and 5.9). Similarities were then drawn between the characteristics of areas with significant differences in dwelling figures (vacant, occupied and total dwellings) and those with higher numbers of missed residents (EwC non-response adjustments).

2.5.2 Selection of indicators to distribute OPCS district adjustments

The selection of indicators was not 'based on hard evidence from the Census Validation Survey or from local demographic checks' (Tye, 1996b). These however, were selected and validated through consultations with the central government, the academics and the local government staff involved in producing population estimates for their respective local authority areas. The chosen indicators had to be:

- *'plausible in their construction (construct validity)*
- *acceptable in that they provide results which are no less plausible than any other practical proxy (face validity)*
- *consistent with relevant direct evidence of the size of adjustment required (external validity).'*

(Simpson *et al.*, 1995)

Residual non-response adjustment

Non-response among residents was allocated to sub-district areas using different indicators for each age group. Missing residents aged between 0-44 were allocated using the numbers of imputed residents and unemployed males aged 20-34. The adjustments to residents aged 0-15s were allocated using the proxy of children in no-earner households. The selection of these indicators was made after comparisons with birth records, unemployed claimants and the young adult sex ratio in 1981. Adjustments to the Census population of the elderly over 80 years of age were made

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Systems Association (BURISA), the Convention of Scottish Local Authorities (COSLA) and the British Society for Population Studies (BSPS).

using DSS pensioner data and were allocated pro-rata to the numbers of residents in the same age group. Discussions following the circulation of the results to local authorities (in July 1994) however, led to the rejection of all three indicators. The final 'Gold Standard' estimates selected only two of the rejected indicators, namely the imputed residents and unemployed males. The justification was that:

'... The general acceptance of the EwC draft gold standard, together with the concern expressed about each of the alternatives, suggested that the final estimates should maintain the same indicators: unemployed males aged 20-34 and imputed residents. ...The indicators used have the nature of being best choice from a set of options with no absolute winner. We have to rely on the views of those who responded to our consultation, setting these criticisms against the stronger ones made of alternative indicators.'

(Simpson *et al.*, 1995)

Imputed residents were selected by the project because they were considered to indicate areas with uncooperative households and individuals. High numbers of imputed residents were also considered as the indicator of the very mobile, the semi-homeless and poor enumerators. The semi-homeless were defined as those temporary visitors that were residing with other members of the household. The local authorities criticisms of this indicator were that they were found to be too high in some areas, which would in turn result in the over allocation of non-response adjustments. These were outer public-rented areas, those with student population (for example, colleges) and areas with large numbers of second homes (Simpson *et al.*, 1995).

The number of unemployed males aged 20-34 was the second indicator of non-response. This was considered as an indicator of the areas with poor socio-economic conditions and the groups most likely to have been missed from the Census (such as the mobile, the homeless and the unemployed). Hence it was considered that the Census response rates among these groups and areas was likely to be lower than other areas (Simpson *et al.*, 1995).

Residual non-response, which had the largest effect on the national population figures, referred to all adjustments (numbered 5,6,8 & 9) under the heading 'Allowance for underenumeration in the Census' in Table 2.2. Wards with the highest estimated residual non-response were generally inner-city areas with high unemployment that also had high Census counts of imputed residents as a result of enumeration difficulties. West City Ward in Newcastle-upon-Tyne was ranked 6th among 25 national Wards with highest estimated 'residual non-response' in the EwC project. Figure 2.3 illustrates the adjustments (as a percentage of all residents) made to men in their 20's, the elderly aged over 85 and all residents in each district within Tyne & Wear and also highlights Newcastle-upon-Tyne as the district with the highest level of adjustments to the Census counts of young males.

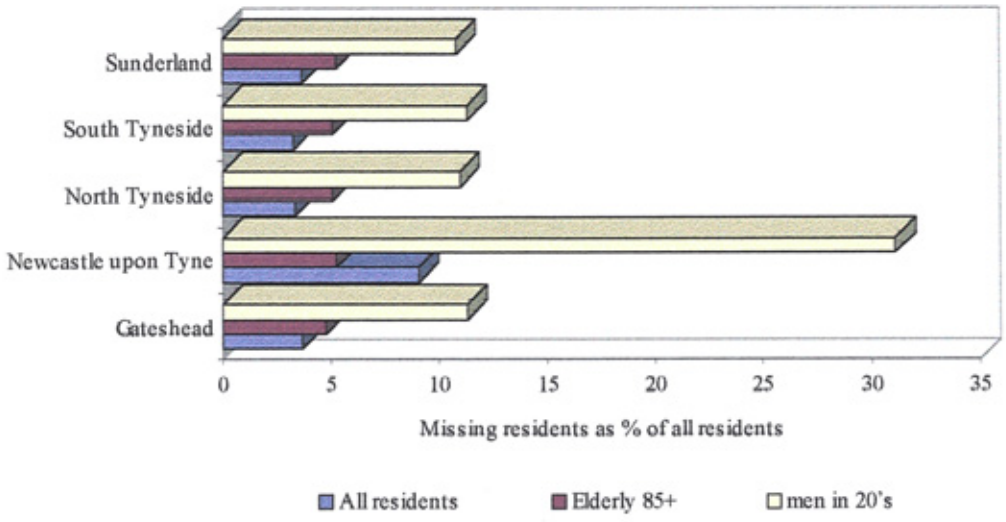

Figure 2.3 Adjustments to the 1991 Census to reach full population - Tyne & Wear - Source of Data: (Simpson *et al.*, 1995)

The student adjustment

Population estimates regarded the students' term-time address as their place of residence, in contrast to the Census where they were considered as visitors. The distribution of student district adjustment was therefore in two stages. Firstly, the removal of student counts from their home area and secondly, their addition to term-time area, using the figures in SAS10. Pupils in boarding schools aged under 16 were regarded as visitors at their term-time address by the Census. The EwC adjustments added this group of students to their term-time address, using the Census figures

termed 'visitors in educational establishments'. This category included visitors of all ages and was in addition to student visitors aged 16+. These figures were from SAS03 (Communal Establishments), SAS10 (Student term-time address), SAS02 (Age and marital status), and SAS11 (Persons present). Concerns regarding student adjustments were expressed by a number of local authorities. The OPCS's district student adjustments were slightly less than the Census figures of 'visitors with this address at term-time' in few districts, thus suggesting that the OPCS's student adjustments in term-time areas should have been slightly higher. The EwC student adjustments in some areas with halls of residence under-estimated the number of students, as Census enumeration coincided with the vacation period. There were no solutions proposed for this problem.

2.5.3 Census imputation process

Imputation was the addition of missing residents and was carried out for the first time in the 1991 Census. This process was investigated in this study in order to establish the contribution of dwelling related errors to the number of imputed residents and in turn missing residents. The CVS report noted that '...there could be errors in the coverage of individual people because the building in which they lived had been missed by the enumerator' (Heady et al., 1994). Imputed residents were also one of the indicators of non-response in the EwC project. The similarities between areas with higher numbers of imputed residents, hence more prone to Census underenumeration, and those with Census excess or shortfall of dwelling counts were included in the correlation analysis in Chapter 5 (Section 5.8).

Residents were imputed 'so that the overall result, for the population as a whole, reflects the characteristics of the people who were missed' (Heady *et al.*, 1994; Mills and Teague, 1991). If no one in the household was present on Census night, then they were classified as 'wholly absent households'. In 1991, the Census enumerators left a form with a letter asking the household to complete the form on their return home. Those absent households, from which a completed form was received, were classified as 'Enumerated wholly absent households'. Households for which no return was received were termed 'Imputed wholly absent households'. The counts of 'imputed

wholly absent households' were sub-divided into two categories, but were grouped together in the Census output tables. The first group were those households that did not want to return a Census form or the form was received too late for processing and the enumerators did not find any evidence of residents. The second group were those that did not return a form for other reasons but the enumerators found evidence of residents at the accommodation.

Four key variables were collected by the enumerators for all absent households, namely the area, number of usual residents, number of rooms and whether the accommodation was self-contained. This information was supplied either by someone in the household before they went away or by a neighbour or as a last resort by estimating the values (OPCS/GRO(S), 1992; 7). At the processing stage, the housing and household information on completed forms from absent households were recorded and referenced by the four key variables. The characteristics of absent households that did not return a Census form were copied from the most recent information from similar absent households (same key variables) who had returned the Census forms. The Census Validation Survey (CVS) identified many sources of error in the process of imputation. These included the possibility that occupied addresses may have been misclassified as vacant, eliminating the need for imputation and resulting in the underestimation of residents in the affected areas. The reverse scenario was also suggested, where vacant addresses may have been mistakenly classified as occupied with absent residents and hence included in the imputation process. The results would have been the imputation of too many residents in some areas.

These errors suggested that low numbers of imputed residents could have been due to the misclassification of occupied addresses as vacant. The errors also suggested that high numbers of imputed residents could have been due to the misclassification of vacant addresses as occupied with residents who were assumed absent on Census night. In the correlation analysis (Chapter 5) therefore, it was expected to find a negative association between the Census excess of vacancies and the number of imputed residents and a positive association between Census shortfall of occupied dwellings and the number of imputed residents. The CVS's 'estimates of these misclassifications are themselves subject to an unknown margin of error' (Heady *et al.*,

1994; 45) and hence OPCS were unable to estimate the net bias arising from mistakes about addresses to which imputation should have been applied.

The effectiveness of imputation at the national level was evaluated by comparing the imputed values for a sample of correctly Census imputed addresses (with households absent on Census night) with CVS counts of residents at those addresses. Although the overall distribution of the actual and imputed were very similar, there were two noticeable differences. The first was that the Census counts imputed more residents to these addresses than those found by the CVS. The second difference was the high female to male ratio compared to that found by the CVS. This ratio however, was not a significant factor in the overall imbalance of Census sex ratios. The success of the imputation process for larger areas such as local authorities, counties, regions and Great Britain as a whole therefore was justified. However, the CVS coverage report indicated that in smaller areas such as EDs, 'there would be discrepancies between the real and imputed' (Heady *et al.*, 1994) number of residents.

2.6 Significance of Census dwelling figures

The Census dwelling figures have not been examined as rigorously as the population figures. Although the CVS report discussed the misclassification of dwellings at the national level, and attributed some of the reasons for missing residents to this misclassification, there have not been many publications examining this concern at the local scale. The significance of dwelling figures has also been noted in the literature covering the national housing need models (Whitehead & Kleinman, 1992; Audit Commission, 1992; Simpson and Dorling, 1994). Other than the Census, there are several sources of housing stock figures used for the estimation of housing needs. These include figures published by the Department of the Environment and Transport in the Regions (DETR) in the English House Condition Survey (EHCS) and the National Dwelling and Household Survey (NDHS). Dwelling figures are also provided in the Housing Strategy and Investment Programme returns made by the local authorities (HIPs).

2.6.1 Census methods of counting dwellings

The 1991 Census definitions guide (OPCS & GRO(S), 1992) defined dwellings as 'structurally separate accommodation'. The enumerators were given guidelines to distinguish between permanent and non-permanent accommodation (such as caravans and mobile homes). A building was to be considered as 'permanent' if at least one of the following criteria was met.

'- The walls are of brick, stone and mortar, concrete, breeze block, or similar material;
- the roof is of ceramic tiles, slate, thatch, shingle or concrete;
- the length of the shortest wall is at least 15 feet.'

(OPCS/GRO(S), 1992)

The enumerators initially identified and issued forms to all occupied domestic addresses with residents present or absent on Census night. Each household space was recorded in the Enumerator's Record Book (ERB) on a separate line. In cases where all household spaces (vacant or occupied) were in the same building, these were grouped together. The number of dwellings in the building was then calculated using a computer algorithm that totalled the counts of household spaces matching the definition of a dwelling under Census terms. Hence the count of dwellings at an address was calculated to be the number of self-contained household spaces plus non self-contained household spaces with separate entrances, plus a count of 1 if there were 2 or more non self-contained household spaces with shared entrances, assuming they formed a single dwelling (OPCS/GRO(S), 1994, 7).

Vacant and derelict buildings

The enumerators divided vacant dwellings into three categories: New, under improvement and other. New or never occupied dwellings were those awaiting occupancy by tenants. Those under improvement were vacant due to 'conversion, renovation or improvement work in progress' (OPCS/GRO(S), 1992). This 'improvement work' suggested anything from major structural alteration to inside decorations since reliable information about the details of improvement may not have

been available to the enumerator. Vacant dwellings classified as 'Other' were those that were clearly without furniture, or information was obtained that the property was not occupied, for example, because new tenants were awaited or that the occupier was deceased (OPCS/GRO(S), 1992).

Derelict buildings were not included in the Census figures unless the enumerators had reason to believe there were persons sleeping rough within those buildings. These persons were classified under 'Other Groups' in the Census 'Communal Establishments' output tables. A building was defined as derelict 'if the roof was partly missing, if floors or staircases were missing, or if the doors were missing and there was no sign that the building was being converted or renovated' (OPCS/GRO(S), 1992). Enumerators obtained any available information from the neighbours or made their own assessment about properties that were boarded up as a precaution against vandalism.

2.6.2 Use of dwelling figures in national housing need assessment methods

Brief descriptions of selected housing need assessment methods are described in this section, in order to emphasize the role of dwelling figures. National dwelling figures and household projections are the key information in most of the national housing need models (Niner, 1989, Whitehead & Kleinman, 1992, Wilcox 1990). The dwelling figures are compiled in various ways depending on the models used and the purposes of the organisations involved (Whitehead and Kleinman, 1992; 6). Dwelling figures may be based on the Census or other government sources (listed in section 2.6), or different assumptions may be made regarding concealed households, unfit properties and vacancy rates. Whitehead and Kleinman (1992) in their review of housing needs assessment included three methods of producing national housing need estimates. These were the dwelling/household balance, Net Stock Approach and the affordability approach.

The household/dwelling balance method

This is the simplest of the selected methods, where estimates are made by comparing the number of dwellings with the number of households. Although the number of

dwellings includes second homes and converted or renovated properties, neither the condition of the housing stock nor the number of vacant properties are taken into account. The result is a surplus of dwellings and hence low estimates of housing need (Whitehead and Kleinman, 1992; Niner, 1989). The Audit Commission also uses a variant of this method where the increase in private sector properties (over a forecasted period of time) is deducted from the increase in households (Audit Commission, 1992). The result is an approximation of the future need for properties in the social sector. Many local authorities also use the household/dwelling balance for their local estimates of housing need. The methods of compiling local housing stock figures varies among local authorities, but the majority employ the Census figures as their main source of dwelling stock information adjusted by other internal sources such as council tax, housing completion and demolitions data.

Net Stock Approach

This method has been used by the Audit Commission, the Institute of Housing and the National Housing Forum (Whitehead and Kleinman, 1992). This forecasts the need for social housing by deducing the private sector output from the net household growth (using the population projection figures) plus the number of demolished/unfit properties, vacant properties, concealed households and temporary accommodation.

The affordability approach

This method devised by Bramley (1991) produced estimates of social housing demand at local rather than national level for 1990 only. This approach considered the affordability issues using district and regional income distributions and house price information. The method used projections of household formation at the District scale and the percentage of those households unable to buy accommodation in the private sector. The subtraction of social sector properties available for relet from these households produced a local estimate. Whitehead and Kleinman (1992) note that this approach produces 'surpluses of relets in the North and Midlands but shortages in the South and London'. The authors also note that this method ignores the supply of housing outside a local authority's boundaries, does not incorporate private sector vacancies and uses one year's figures only, which may not be a sufficient time period to reflect the changes in the housing market.

2.6.3 Local examination of Census dwelling figures

The central government's use of the household/dwelling method for assessing housing need has been criticised as 'a very unrealistic model of how housing is provided to households in Britain' (Dorling, 1993). This criticism refers to the exclusion of factors such as the condition of housing stock, the affordability issues and the vacancy reserve from this model (Whitehead and Kleinman, 1992; Niner, 1989). At the District scale, exclusion of vacant dwellings for example, can result in inconsistencies between the national and local estimates of housing need. Niner (1989) in her assessment of housing need estimation methods, highlights regional differences. She also notes that the use of these factors in various housing need estimation methods depends on different priorities :

'.... If shortage and access are to receive greater weight in such calculations, as Bramley argues, there will be marked shift of resources to the south of England. If poor house conditions retain or increase their weighting, a very different picture emerges, with the Midlands and the North having greater priority. How this is to be resolved is a political rather than a technical issue.'

(Niner, 1989)

The investigations of the House of Commons into housing need in 1996 also highlighted concerns regarding the derivation of local housing need estimates from those calculated by the central government (Friend of the Earth, 1997):

'Some witnesses expressed concern about the top-down nature of the way that housing need is presently assessed; using national projections as a base and then extrapolating local targets from them, they argued, involved playing a sort of numbers game at the local level which did not necessarily reflect local needs and conditions'

(HMSO, 1996)

Other than concerns regarding the validity of national housing need models and their application to local areas, there have been wide debates concerning the implications of Census underenumeration on these estimates. Simpson and Dorling (1994) note that in 1991, the Census total dwelling figures were much greater than expected by DETR and

that this resulted in the 'sudden upward revision of official estimates of the dwelling stock'. They also note that DETR appear 'to have revised downwards the estimates of vacant dwellings, as compared with the census' (Table 2.3). This suggested that in comparison with the mid year estimates the Census total dwelling stock figures were too high and the vacancy figures were too low. The authors illustrate how the Census underenumeration of households can contribute to increased vacancy rates:

'....even a small estimate (1.8 per cent) of the national non-response of households can translate into a 71 per cent overcount of vacant dwellings and thus have a dramatic effect on national housing debates'

(Simpson and Dorling, 1994)

England ('000s)	EHCS (DoE 1993)	1991 Census (OPCS)	Difference from the Census per cent
Dwellings	19,700	19,671	-0.1
Households	19,111	18,766	-1.8
Population	48,100	46,337	-3.7
Vacant dwellings	639	1,092	70.9
Vacancy rate	3.2%	5.6%	71.1

Table 2.3 Number of vacant properties according to EHCS and the 1991 Census - Adapted from Simpson and Dorling (1994)

The authors also refer to the results of 1991 Post Census Survey of Vacant Property (PCVS) in Scotland which suggested that 9% of all properties classified as vacant in the 1991 Census were in fact occupied. It is therefore argued that 'more faith should be placed in the DoE figures than the raw census counts'. This suggestion is also supported by the CVS (Heady, *et al.*, 1994) report. Although according to the report, Census field procedures did not lead 'to a net underenumeration of occupied accommodation', it is concluded that:

'...the comparison between the Census age distribution and the age distribution estimated by demographic methods, ...does suggest that there may have been a considerable net underenumeration of occupied accommodation.'

(Heady *et al.*, 1994; 52)

In response to this evidence and in an attempt to prepare for the enumeration of 'difficult' areas, OPCS have considered the use of administrative records to improve

coverage of the 2001 Census. These include NHS, Council Tax and DSS registers, which can be used at the aggregate level to 'aid census data quality monitoring, even if the register data initially relates to an earlier time period'(OPCS/GRO(S), 1996):

'...quality and problems with matching will prevent their use at the individual level. They are likely to improve in quality by 2001, it is intended that research be carried out into the feasibility of either using administrative records as a sampling frame for the improved CVS or as an independent source to link to the Census.'

(OPCS/GRO(S), 1996)

OPCS at one time considered reviewing the definitions of household and dwellings. They also considered using addresses or delivery points, following the evidence presented in the CVS regarding the enumerators' difficulties in identifying households and dwellings in multi-occupied buildings. One of the considered and subsequently selected output options for the 2001 Census was based on postcode units digital boundaries. These were modified and linked to features in the OS digital maps (Chapter 8 – Section 8.5 includes more details). Another considered (and subsequently selected) option was outputs 'constructed through geographical references for individual households (England and Wales only)' (OPCS/GRO(S), 1995b; 7). This was carried out using 0.1m co-ordinate references from the O.S.'s Address-Point. The analysis of Census data in conjunction with property registers was demonstrated by Martin and Higgs (1995). Part of their study (detailed in section 2.2.1) focused on the comparison of datasets, during which the authors compared the Census household figures to property counts, calculated using Address-Point, for EDs. They noted that one of the possibilities of the large discrepancies between these figures could have been 'that the census has underpredicted counts as a result of underenumeration in the census' (Martin and Higgs, 1995). The investigation of this possibility however was not in the scope of their study 'without recourse to in-depth analysis of the situation in the Inner Area of Cardiff' (Martin and Higgs, 1995). The present study focuses on dwellings instead of households and aims to explain the differences between dwelling figures obtained from the Census and several data sources from Newcastle City Council.

2.7 Chapter Summary

This chapter has identified the areas for further research and has developed the overall thesis. This is to assess whether the comparison of the 1991 Census and the local authority dwelling figures, at the local scale, can contribute to the understanding of Census underenumeration at the national scale. Data integration, interpretation and the explanation of differences in dwelling figures, formed the main aims of the study. The need for GIS-based investigation of local authority data and the integration of this with Census data was emphasised with reference to the developments of GIS in local government (Section 2.2). GIS implementation problems were identified as the main obstacle in the extensive spatial analysis of this data. Documenting the problems of data integration and data interpretation therefore, formed an important part of this study. The chapter highlights the role of Census dwelling and population figures in government finance and housing need calculations (Section 2.3). It also notes the role of dwelling figures, dwelling related Census errors and Census methods of counting dwellings (Sections 2.4, 2.5, 2.6) in the context of Census underenumeration of residents. The numbers of imputed residents, communal establishments and accommodation not used as main residence were found to be significant factors in Census underenumeration. These were selected and incorporate in the correlation analysis detailed in Chapter 5 (Section 5.8). This analysis made comparisons between areas with differences in dwelling figures and those more susceptible to Census underenumeration.

Chapter 3 Integrating the 1991 Census and local authority data

Chapter Overview

This chapter describes the data sources and the terms used in the datasets from the 1991 Census and Newcastle City Council. The selected methods of geo-referencing and data integration reflect both the research described in the reviewed literature and some of the reported practical problems experienced by most local authorities. Section 3.1 provides an overall description of the chapter and sections 3.2 and 3.3 describe the datasets and the georeferencing methods. The main findings of the chapter are summarised in section 3.4 and discussed in Chapter 7 (Section 7.2).

3.1 Introduction

The first objective of this study was to investigate the methods of data integration (Chapter 1 – Section 1.2). Most of the local authority datasets were dispersed among several functional areas of the authority with different referencing schemes. The integration process involved the identification of data sources, resolving definitional differences and geo-referencing datasets. Data sources were identified through an assessment of their fitness for purpose in the context of Census underenumeration of dwellings. Definitional differences between the Census and local authority data were because of the different data collection purposes (Section 3.2). The 1991 Census was carried out by the OPCS in order to collect information about the resident population in Britain and 'a certain amount of information about the accommodation in which they lived' (Heady *et al.*, 1994). The local authority datasets however, were collected routinely for administrative purposes related to specific functions of departments within the authority. The third stage of data integration was geo-referencing local authority datasets (Section 3.3). The grid co-ordinates assigned to this data as part of this study, served as the common geographical link that was required to compare this address-based information with the area-based Census data.

3.2 Data Sources

Other than the basic dwelling counts, information about dwelling type, tenure and local regeneration programmes around the time of the Census, were also considered. Wherever possible, explanations for the observed differences in dwelling figures were sought by reference to Census data in combination with information from a variety of local authority sources, in both digital and manual formats (e.g. housing annual reports). The following sections describe terms, definitions and data structures of both the Census and local authority data and outline differences that were found to be important in the data interpretation process. Census definitions have either been directly quoted or adapted from the published 1991 Census definitions report (OPCS/GRO(S), 1992).

3.2.1 Census Data

Census data for Wards were provided in Census LBS tables and those for EDs were provided in Census SAS tables (OPCS/GRO(S), 1991e). There were in total six Census tables (SAS60/ 61/ 62/ 63, LBS64/ 65) that included information relating to tenure, type and occupancy of residential dwellings. However, only three tables provided this information for all occupied and vacant dwellings (LBS/SAS61, LBS64, LBS65). Other tables relating to communal establishments (SAS03) and imputed residents (SAS01) were also used as the investigation progressed.

Census Data: definitions

The principal term used in the 1991 Census was the **household**. The OPCS defined a household as 'one person living alone; or a group of people (who may or may not be related) living, or staying temporarily, at the same address, with common housekeeping' (OPCS/GRO(S), 1992). An accommodation available for a household was defined as a **household space**. There may have been several household spaces in one building. Each of these household spaces may have been classed as a dwelling depending on: the living arrangements of the households, whether or not the accommodation was self-contained and whether or not the accommodation had its own separate front door.

Dwellings were defined as 'structurally separate accommodation' (OPCS/GRO(S), 1992; OPCS/GRO(S), 1991d) and were further classified into shared or unshared dwellings. A shared dwelling was not self-contained and had a common entrance into the building (Green and Holroyd, 1991). An unshared dwelling was either self-contained with its own separate or common entrance into the building or not self-contained but had its own separate entrance. For example under the Census definitions, a building converted into several bedsits (not self-contained and without separate entrances into the building) would be considered as a shared dwelling with several household spaces. Detailed description of Census dwelling enumeration methods were provided in Chapter 2 (Section 2.6.2).

Unattached household spaces were defined as 'accommodation sharing an entrance into the building ...that is not self-contained ... grouped to form a single shared dwelling. However, where there is one such household in the shared house, bungalow or flat, the accommodation does not form, or belong to the dwelling but is classified as an unattached household space' (OPCS/GRO(S), 1992). For example, '... a bed-sit which used a bathroom the other side of a hallway, sharing the hallway and door with a household which did not need to use that bathroom because it had all its facilities behind its own door into the hall.' (Heady *et al.*, 1994).

Occupancy type of dwellings

The relationship between household spaces and dwellings became particularly significant when the investigation focused on explaining observed differences between local authority and Census vacant dwelling counts (in Chapters 5 and 6). Addresses which were the basic units of accommodation in the local authority datasets may have been classed as either household spaces or dwellings. The occupancy of a dwelling, according to Census definitions, was decided by reference to the occupancy of the constituent household spaces. The order of occupancy types in a hierarchical classification table (Table 3.1) was then used to determine the overall occupancy type of the dwelling. For example, a dwelling comprising two vacant and one occupied household space, would be classified under 'with residents – persons present' category, because this was of a higher priority order than the vacant category.

Priority Order	Occupancy Type
1	With residents - persons present
2	With residents – absent households (no persons present)
3	Vacant – under improvement
4	Vacant – other
5	Persons enumerated but no residents – owner occupied
6	Second residences
7	Persons enumerated but no residents – not owner occupied
8	Holiday accommodation
9	Student accommodation
10	Vacant – new, never occupied

Table 3.1 Priority order of occupancy types

Communal Establishments were defined as those where catering was provided for the residents. For example homes for the elderly (sheltered accommodation) or the disabled, hospitals, halls of residence and hostels. In the case of sheltered accommodation however, the Census enumerators were instructed to treat all residents as separate households if more than half of them had their own separate cooking facilities. Accommodation such as nursing homes and student hostels were only considered as communal establishments if there was 'someone in charge to take responsibility' (OPCS/GRO(S), 1992) for completing the relevant Census forms. Otherwise, 'each person, or group of persons sharing meals or accommodation, was treated as a separate household' (OPCS/GRO(S), 1992; OPCS/GRO(S), 1991a). The structure of Census LBS/SAS03 table, containing communal establishment figures, is included in Appendix 8.

Vacant accommodations were categorised under 'new', 'under-improvement' or 'other'. **Derelict** buildings were not included in the Census tables. These were described in Chapter 2 (Section 2.6.2). The definitions of vacant and derelict accommodation included four key points (OPCS/GRO(S), 1992; 24) which are noted here. The first was that the enumerators were instructed to treat any vacant accommodation previously used as a small hotel or boarding house as a private residence (rather than a communal establishment). The second point (based on previous evidence available to OPCS) was that there were indications of misclassification between the 'Under improvement' and 'Other' categories. Thirdly, not all the properties classified under the vacant 'Other' category were necessarily in the housing market, some could have been awaiting tenants after being purchased. Furthermore, 'known future plans, for example, to demolish the building, should not

have been taken into account' (OPCS/GRO(S), 1992). The reason for this given by OPCS (1992) was that the 1991 Census was 'a snapshot of the housing stock at a point in time. Thus, vacant accommodation was classified as at 21 April 1991'. This suggested that Census vacancy counts may have in some cases included vacant accommodation that was not treated as such by the local authority, hence the Census excess of vacancies in comparison with local authority figures. And fourthly, if there were doubts about whether the property was derelict or vacant, the property was categorised in the vacant 'Other' category. This suggests that some derelict properties may have been counted as vacant, hence this definition could also have contributed to the observed over-count of Census vacancies in comparison with local authority figures. The implications of these definitions are discussed further in Chapter 7 (Section 7.2.1).

Accommodations not used as main residence were subdivided into two categories; those unoccupied on Census night and those where persons were enumerated but there were no usual residents. The figures in the former category were added to the counts of vacant accommodation prior to comparisons with local authority vacant dwelling counts. This category of unoccupied accommodation was further sub-divided into three groups: second residences such as company flats, holiday houses, weekend cottages, etc; holiday accommodation in permanent buildings, such as self-catering holiday flats; and **student accommodation** which could have been houses or flats. Halls of residence were enumerated as communal establishments.

Census Data: Structure

There were fewer classification categories and hence less detailed information in Census SAS tables (EDs) than in the LBS tables (Wards) because of data confidentiality regulations. Table 3.2 and 3.3 illustrate this using the categories in tables LBS/SAS61 and LBS/SAS63.

Occupancy types in table LBS61	Occupancy types in table SAS61
All types of occupancy	All types of occupancy
Dwellings with residents	Dwellings with residents
Dwellings with person(s) present	
Dwellings with no persons(s) present	
Vacant Accommodation	Vacant Accommodation
New, never occupied	
Under improvement	
Other	
Accommodation not used as main residence	Accommodation not used as main residence
No persons present	No persons present
Second Residences	
Holiday Accommodation	
Student Accommodation	
Persons enumerated but no residents	Persons enumerated but no residents
Owner occupied	
Not owner occupied	

Table 3.2 Comparison of classification groups in LBS 61 and SAS 61

Dwelling types in table LBS63	Dwelling types in table SAS63
Total dwellings	Total dwellings
Total unshared dwellings	Total unshared dwellings
Unshared dwellings – purpose built	Unshared dwellings – purpose built
Detached	Detached, Semi-detached, Terraced
Semi-detached	Purpose built flat
Terraced	
Purpose built flat in: Residential Building	
Purpose built flat in: Commercial Building	
Unshared dwellings - Converted	Unshared dwellings – In converted or partly converted accommodation
Flat	
Flatlet	
Unshared dwellings - Non self-contained	
Flat	
Rooms	
Bedsit	
Shared dwellings	Shared dwellings
Non-permanent accommodation	Non-permanent accommodation

Table 3.3 Data classification: LBS 63 and SAS 63

3.2.2 Local authority Data

Integration of diverse, multi-purpose local authority data in this investigation involved resolving several issues. The first, was the identification of relevant information within the data in the context of census underenumeration of dwellings. Second was the creation of comparable information (in terms of definition) to those presented in the Census tables. An example of this was the exclusion of sheltered accommodation from the counts of local authority properties, as they are tabulated separately in the Census communal establishments tables. The third issue was to ascertain the availability of

data at various geographical resolutions (i.e. point data, aggregate data). Vacant dwelling figures for example were investigated using both individual level (digital format) and Housing Neighbourhood level (manual format) data. The technical feasibility of linking databases and their subsequent geo-referencing was the final and the most important issue in terms of operational use of data within GIS. Progress in resolving this last issue corresponded with GIS developments within both the Housing Department and the local authority in general (Section 3.4). This process highlighted many problems associated with matching addresses of different formats and distinct property referencing schemes used by the Housing and Planning Departments. While these schemes were successfully incorporated within databases utilised for the departments' respective functions, they presented significant problems when attempting to conduct any GIS-based analysis. In the wider context, these were also pertinent issues in the authority's progressing plans to implement GIS at both departmental and corporate levels. In seeking solutions to such problems, Newcastle City Council continued to co-ordinate spatial data holdings through the adoption of BS7666 national standard. This standard recommended by the local government management board (LGMB) had four parts and included specifications for both land and property referencing schemes and address structures (Section 2.2.1).

At the inception of this study (1995/1996), GIS developments in Housing and Planning departments in particular had some influence in the selection of data integration methods and this must be taken into consideration. The Housing Renewal section of Housing Department was in the final stages of geo-referencing the council property database. The majority of geographical co-ordinates in this database however were derived from the Planning Department's Land and Property Gazetteer (LPG) which itself was subject to continuous changes (see Section 3.4 for full details). The computer development section was in the second year of introducing GIS into the authority and had started implementing land charges and map management applications. This section together with the Planning Department was also involved in the creation of a land and property gazetteer that was in compliance with the 1994 British Standard 7666. This involved transferring all business and residential addresses, which at the time were maintained within separate databases, into a new GIS system. The new database was continually updated with new addresses, and

corrections were made to both grid co-ordinates and postcodes. This process was further assisted with the availability of Address-Point through the authority's Service Level Agreement (SLA) with the Ordnance Survey (O.S.) in 1996. The following is a list of several databases and manual records made available from the Housing Needs and Housing Renewal sections of the Housing Department, the Planning Department and the Council Rates section. Datasets such as the housing benefit claimants and vacant properties (from the Community Charge system) were downloaded from the housing mainframe by the computer section of Newcastle-upon-Tyne City Council. Full details of these are given in the following sections.

a) Council properties database
b) Demolished/sold council properties
c) Local authority sheltered accommodation
d) Structure of council properties
e) Land and Property Gazetteer
f) Vacant addresses
g) Residential addresses
h) Computer printouts of vacant properties
i) Housing Benefit Claimants
j) Newcastle City Council's Housing Annual reports
k) Sites with newly built or converted properties
l) Housing estate boundaries and the City Challenge Regeneration Scheme boundaries

a) Council Properties

The Housing Property Information System (HPIS) maintained by the Housing Renewal section of the Housing Department held records of council properties and associated information relating to functions of the Housing Department such as repairs. The council properties database (Appendix 1), which was made available to this study, included the address, the geographical location (1 metre grid co-ordinates) and structural details of over 39,000 properties (as at November 1995). These properties comprised tenanted or vacant properties, newly built or converted properties, stock rented to other committees, properties improved for sale, sheltered accommodation and

emergency accommodation. A unique property referencing scheme was shared between this and other datasets held by the housing mainframe, known as the CPM (Central Property Module) property ID number. In addition to the CPM property ID number, 80% of properties had associated Unique Property Reference Numbers (UPRN) that corresponded with the property referencing scheme of the Planning Department's Gazetteer.

b) Demolished/sold council properties

This was downloaded from the HPIS register by the Housing Renewal section and includes 3600 council properties demolished, sold or transferred to housing associations since January 1990 (Appendix 2). This database did not include grid co-ordinates for individual properties. These were added as part of this study, through linking the database with the Planning Department's Gazetteer, using property addresses. Although the CPM property ID number was available these could no longer be found in the council properties database.

c) Local authority sheltered accommodation

The Housing Department's computer printouts identified buildings and localities of sheltered accommodation owned by the local authority and housing associations. The individual addresses and grid co-ordinates of this type of accommodation were obtained using the council property database. A new database was constructed and later used to aggregate records for EDs and Wards.

d) Structure of council properties

A database obtained in May 1998 from the Housing Renewal section of the Housing Department. The information about the structure of properties (39102 records) originated from the council tax section of the authority and was maintained within the HPIS system. The fields contained in this database were the CPM ID number, Street Number, House Number and the type of accommodation for each of the council properties in 1998. Details of the structure of this database are provided in Appendix 6. The definition of Houses in Multiple Occupation (HMO), according to the council tax section of Newcastle City Council, was noted in order to compare this with the definition of communal establishments and shared dwellings in the Census tables. It

was found that this type of accommodation was the equivalent of a shared dwelling under the 1991 Census definitions. This was used to help explain the differences between the Census and local authority counts (Chapters 5 and 6). In 1997, an HMO was defined as 'one which has been built or adapted for occupation by tenants or licensees who are not living as a single household'. Another definition was given as '...a dwelling which is occupied by a person or persons, each of whom holds a tenancy or licence to occupy part only of the dwelling or has a license to occupy but is not liable to pay rent or a licence fee in respect of the dwelling as a whole.' (Newcastle City Council, 1997). A house divided into separate bedsits was given as an example of an HMO. A block of flats however, were not considered as an HMO, because each flat within a block was classed 'as a separate, self-contained dwelling in its own right. The owner and not the tenant was liable to pay council tax of a house in multiple occupation' (Newcastle City Council, 1997). The concerns regarding the definition of HMO's had already been expressed in 1991, when the authority noted that 'It was disappointing that when amending the law the government did not take the opportunity to address the problems caused by the legal definition of a house in multiple occupation.' (Housing Annual Report, 1990/91)

e) Land and Property Gazetteer (LPG)

This database was originally constructed using two historic (pre 1990) residential and business directories, through joint efforts of the Planning Department and the Computer section. The gazetteer was progressively updated by removing demolished properties and adding newly built properties. The updating process also involved adding new information such as flags for business use and multiple occupancy. Several extracts of this database were therefore obtained during 1995 and 1997 in order to include records of properties demolished since the time of the Census. This gazetteer was used for geo-referencing other datasets. The 1995 extract (~130000 records) held historic records of properties while the 1997 extract (~117000 records) included extra information relating to the use of properties. These held records of residential and business properties, complete with Unique Property Reference Numbers (UPRN) and 1 metre precision O.S. grid co-ordinates. The UPRN, used in this register, was different from the CPM property ID number, used in the council properties database. Although this register differentiated between local authority, private and housing

association properties, many of these and their co-ordinates were updated throughout this project by comparisons with the council properties database. (Appendix 3)

f) Vacant addresses

A database containing vacant properties on Census night, from the historical 1991 Community Charge records was obtained from the IT Section of the authority, under an internal service level agreement with the Housing Department. The Community Charge system (relating to persons) replaced the authority's previous rates system (relating to properties). After the introduction of the Community Charge, records relating to adults over the age of 18 and liable for payments were added to the rates system. These records specified the account type that determined the type of Community Charge. Three types of Community Charge were introduced in 1990, personal, standard and collective (Lomax and Reynolds, 1991; Oppenheim, 1987). The standard Community Charge was that payable by tenants or owners of second homes and vacant properties. The computer section used this information to identify vacant properties at the time of the Census (Appendix 4). Information on individuals, their current residence, previous residence and property details were all held within a relational database framework (Figure 3.1). The process of identifying vacant properties was carried out in two stages. First, all residency records (properties) that had started before, and ended after 21st April 1991 were selected from the residency databases. The properties related to these selected residency records were identified as those that were occupied or vacant on Census night. Vacant properties were then selected, using the individuals database, that included account details. Those properties that were linked to individuals paying the standard Community Charge were vacant properties or second homes. Derelict buildings were not included in these records.

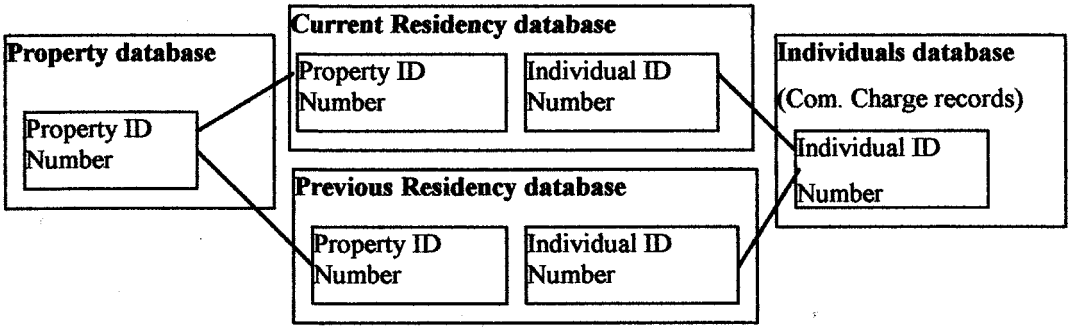

Figure 3.1 Vacant property records from the 1991 Community Charge register

g) Residential addresses

This database was obtained from the 1998 Council Tax register and held records of all residential properties (as at 1998) with additional information about property structure (e.g. a bedsit or a flat). This database was used in conjunction with the LPG Gazetteer in order to provide extra information about the use (residential/business) and structure of properties. This file was geo-referenced and converted into a shapefile[5].

h) Computer printouts of vacant properties

These were Housing Department's computer printouts (as at 5/4/91 and 26/4/91) maintained for the purpose of preparing the necessary information for the Housing Annual reports. These summarised local authority vacant dwelling figures by housing estates and areas. A small number of these properties were within sheltered accommodations.

i) Housing Benefit Claimants

This dataset was obtained from the housing mainframe by the computer section and included the claimants' address, postcode and household characteristics. Properties in this database were geo-referenced using the LPG Gazetteer, the council database and the O.S. digital maps. The information in this database was a 'snapshot' of all claimants as of 30th April 1991.

j) Newcastle City Council's Housing Annual reports

These reports (for the years 1989 to 1995) provided general information relating to housing management and investment plans of the authority within the City. It also provided aggregate counts of vacant dwelling figures (in Housing Areas and Neighbourhoods) which included properties available for relet, undergoing major repairs, or designated for possible sale/transfer to housing associations. The Housing Annual Reports were written for tenants within 6 months of the end of each financial year, as required by the 1989 Housing Act. These report on local consequences of change in Government's proposals and legislation and issues considered by the local Housing Committee. The reports also included investment plans in the City, housing management, maintenance, finance and performance indicators. The figures in the

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[5] A shapefile is a term used by ESRI Arcview software to define a set of geographically co-ordinated data and its associated map

reports were based on the Housing Department's internal computer records around that time.

k) Sites with newly built or converted properties

This information was obtained from the Planning Department in the form of paper maps. The boundaries of sites containing newly built or converted properties, completed by the end of 1990 calendar year, were identified and the capacity for new completed 'units' were provided. The boundaries were digitised and the information was maintained within an Arcview shapefile.

l) Housing estate boundaries and the City Challenge Regeneration Scheme boundaries

These were digitised as part of this study, from paper maps provided by Newcastle City Council's Housing Department. These boundaries cover parts of Benwell and Scotswood Wards.

Data Confidentiality issues

All the datasets mentioned above that included confidential information relating to individuals were used in accordance with the guidelines and practises of the City Council (LARIA, 1998), as informed by the Data Protection Act. Geo-referencing these datasets took place on the City Council's premises. The data was aggregated to protect anonymity, and any publication will not be in breach of confidentiality.

3.2.3 Data from other sources

Other databases were collated throughout the duration of the project for address-matching and geo-referencing purposes from the Tyne & Wear Research and Intelligence Unit (TWRIU). This unit also provided Ward-based Census adjustment figures produced through the EwC project. The ED-based EwC Census adjustment figures were obtained via Manchester Information, Datasets and Associated Services (MIDAS).

Land-Line

The O.S. Land-Line digital map of Newcastle-upon-Tyne was made available to the Housing Department as part of the Service Level Agreement (SLA) between the O.S. and the local authority. These maps were the digitised 1:1250 street maps of Newcastle and included building outlines and the surrounding land parcels. These also included the house numbers that were used to geo-reference many of the addresses held in the council properties database and the LPG Gazetteer.

OSCAR

This was another O.S. product made available to the Housing Department under the SLA and contained centre line of roads (and road names) in Newcastle-upon-Tyne. This together with the Land-line product was used for geo-referencing purposes.

1991 ED and Ward boundaries

Digitised ED boundaries were produced by ED-Line Consortium (a partnership involving Ordnance Survey, MVA Systematica, London Research Centre and the Data Consultancy). The 1991 Ward boundaries were made available from Northumbria University with the support of the ESRC.

The ED/Postcode Directory

This file was created by the OPCS and the GRO(S) in order to provide a means of relating individual-based information to Census EDs. It contained records of every postcode in the UK together with their associated O.S. grid co-ordinates (100 metre precision) and Census ED codes. The co-ordinates in this file corresponded to those in the Central Postcode Directory (CPD), also created by the OPCS (based on a file originally created by the Department of Transport for traffic modelling) and marketed commercially by the Royal Mail as the 'Postzon' file (OPCS, 1991). This file was obtained through the University of Manchester's MIDAS web site. The grid co-ordinates in the ED/Postcode directory corresponded to the south west corner of the 100 meter grid cell containing the first address in the postcode unit. The postcodes in the file originated from the Royal Mail's Postcode Address File (PAF). This listed all addresses and postcodes in the UK. The 1991 and 1995 versions of the ED/Postcode directory together with the 1991 PAF software were used to obtain nearest grid co-

ordinates for the few properties that could not be located in the LPG Gazetteer. There were however known problems associated with the accuracy of these co-ordinates resulting in misallocation of address-based information to EDs. These problems together with their implications on the present study are discussed below in section 3.3.8.

3.3 Geo-referencing local authority datasets

Geo-referencing records enabled the aggregation of point data into areal units using the point-in polygon facility in Arcview. It was necessary to ensure the accuracy of the grid references, in order to produce reliable final aggregate areal counts. In seeking to make the optimum use of available data resources, the structure and content of the databases outlined above were explored with the view to establish links between them for geo-referencing purposes (Figure 3.2). The council properties database (which contained grid co-ordinates and LPG UPRNs for the majority of properties) and the LPG Gazetteer were identified as the key datasets. These base files were used concurrently, as the LPG Gazetteer was a historic database, at the initial stages of being updated while the council properties database was updated routinely as part of the Housing Department's daily functions. All other datasets that held details of occupancy and structure of properties in private and social sector, were regarded as attribute files. These contained at least one spatial referencing item (such as CPM property number, address, postcode, and tenancy reference number), which served as common items necessary to link them to base files and assign grid co-ordinates. The following diagram describes the structure of datasets in relation to the property referencing schemes in existence.

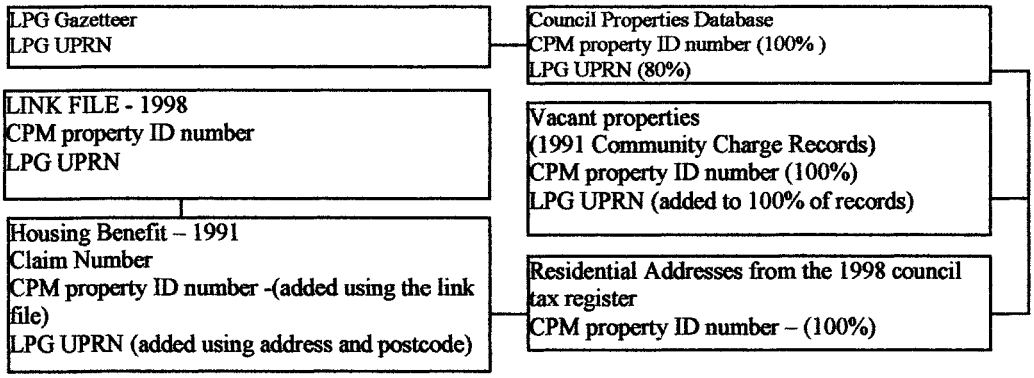

Figure 3.2 Data structures and property referencing schemes

The preliminary tasks were therefore identified as allocation of grid co-ordinates and LPG UPRNs to the remaining records in the council properties database.

3.3.1 Accuracy of the Council Property Database and the LPG Gazetteer

In attempting to avoid the propagation of errors among attribute files, priority was placed on efforts to ascertain the accuracy of grid co-ordinates in both property registers. The council properties database in its original state, contained grid co-ordinates for 95%, and LPG UPRNs for 80% of properties. These were derived from the LPG Gazetteer through joint efforts of Housing Renewal and Computer sections of the authority. The remaining records (over 2000) were geo-referenced as part of the present study by establishing a link between the council properties database and the LPG Gazetteer. This link was achieved (in ACCESS) using three fields shared by these datasets, the address, the postcode and the LPG UPRN. There were however many problems associated with the use of each of these field in geo-referencing the remaining records. The address field contained addresses in varied formats (see section 3.3.3), the postcode could only provide the approximate location of the property and was not always present (Section 3.3.6), and the LPG UPRN was present for only 65% (1300) of the records with missing grid co-ordinates. The remaining 35% (700) of records were matched to the corresponding records in the LPG Gazetteer using the combination of postcode and address (Section 3.3.5). Matching council property records to those in the LPG Gazetteer revealed many inaccuracies within the LPG Gazetteer itself which were corrected. These are described in sections 3.3.3 through to 3.3.8. Some council property addresses were found to be missing from the gazetteer. In these cases the grid co-ordinates were derived individually within Arcview, using the O.S. Land-Line and OSCAR digital maps. The street names were available in OSCAR and provided information on the general location of the property while the O.S. Land-Line included house numbers of individual properties. The co-ordinates were taken from the centre of building outline.

3.3.2 Linking property referencing schemes

Following the completion of georeferencing the council property file, work progressed to assign LPG UPRNs to 20% (over 7500) of records in this database. This created a link between council properties in both registers in order to check their associated grid co-ordinates and postcodes in the LPG Gazetteer. This link was also necessary in order to link other attribute files relating to council properties to the LPG Gazetteer. The property registers were converted into Arcview shapefiles and the records were matched using the geographical co-ordinates. The x and y co-ordinates were concatenated into a single field for this purpose. This method however was not suitable for matching council addresses with the same co-ordinates (e.g. flats in a single building). In these cases records were matched using the address field and updated with UPRNs individually. Data integration problems, encountered while completing the above tasks are listed below, and explained in detail in the following sections:

Address matching problems
Missing council property addresses from the LPG Gazetteer
Duplicate UPRN entries in the LPG Gazetteer
Problems associated with the use of ED/Postcode directory in small area analysis
Errors in the LPG Gazetteer address co-ordinates
Problems associated with ED boundaries

3.3.3 Address Matching problems

Databases were linked using a common field when key items of information such as grid co-ordinates or UPRNs needed to be transferred from one database to another. This link was necessary when joining the main property registers or joining each of the attribute files to property registers. This proved highly problematic when the only common field present was the address. Property addresses used across the authority remain in a variety of formats despite the recent developments in address standardisation. The quality of addresses in databases constructed around 1991, which were used in this study were especially poor. This however was unavoidable as these administrative records were not gathered for use within GIS and address

standardisation was not considered as a priority at that time. A number of methods (using soundex and Qbasic programmes) were used to geo-reference datasets and were partially successful. After using each method however, there remained a few records, which were geo-referenced manually. Although a small percentage of database records were matched in this way, the necessary time to complete the task formed a significant proportion of the available time for data manipulation. The components of the full property address in the LPG Gazetteer were stored in three fields listing the building name, flat name or number, the street name and the area. The addresses (excluding the area) in the council properties database however, were stored in a single field and often in different formats to those in the gazetteer. In some cases, an address in a multi-occupied building listed in the LPG Gazetteer, was identified by the building name, the house number and street name while in the council properties database the building name was omitted and a single field contained the house number and street name. The address matching process involved separating the address components and rebuilding them, using variations in the original address structure. The numerous combinations of these components, used in all databases meant that the application of a single formula for simultaneous matching of all addresses was not possible. Automated matching of addresses was also sought by using Arcview's geocoding facility. This facility allowed a file (converted to a theme) to be used as a reference file which was then used to geo-reference other attribute files using address as the common field. The supported address formats within Arcview however are those used in the US. Although adding the UK address structure to this list was possible, the application had to be written by ESRI themselves. As such the 'single field' option was used that allowed the address field to be treated as a text string. The x and y co-ordinates in the reference file were concatenated into a single field and added automatically by Arcview, to attribute files as an additional field.

3.3.4 Missing council property addresses from the LPG Gazetteer

The geo-referencing process highlighted approximately 40 areas around the city where council addresses appeared to be missing from the Gazetteer. A list of these addresses, together with maps of their locations were prepared for the Planning Department. In 1996, the department confirmed that the LPG Gazetteer was continuously updated and

new properties built since 1988 were in the process of being added to the gazetteer. They also confirmed plans to exclude demolished properties from this file during 1997.

3.3.5 Duplicate UPRN entries in the LPG Gazetteer

During the process of allocating UPRN's to the council property addresses, duplicate UPRN entries were found for a small percentage (335) of addresses. After consultation with the Planning Department, these were identified as residential accommodation located above business addresses. Duplicate UPRN's were explained to be the result of combining the separate directories, which contained residential and business addresses. Problems such as these were expected to be solved by the department, with the installation of the new GIS system, which at that time was in progress.

3.3.6 Problems associated with the use of the ED/Postcode directory in small area analysis

One of the methods considered for the aggregation of datasets into EDs, involved using postcodes, partially present in datasets. Records in the attribute data files, once complete with postcodes, could have been directly linked to EDs using the ED/Postcode directory (OPCS/GRO(S), 1991c). This method would have hence eliminated the need for the time consuming task of address matching. The disadvantages of this method however, were considered, as highlighted in previous research (Gatrell, 1989; Gatrell *et al.*,1991; Martin, 1992; Reading and Openshaw, 1993). Gatrell (1989) explored the accuracy of methods used to allocate postcodes to EDs. This was carried out by comparing the postcode grid co-ordinates in Whitehaven (Cumbria) from the CPD directory and a commercial property register created by Pinpoint Analysis Ltd. Distances were compared, and the two sets of co-ordinates were allocated to EDs using point-in-polygon and nearest ED centroid methods. The results confirmed that the more reliable method of allocating postcodes to EDs was the use of ED boundaries in the point-in-polygon method. The study also showed that when using this method with CPD co-ordinates as oppose to Pinpoint co-ordinates, 40 percent of postcodes in this largely rural area were misallocated to EDs. This figure

was suggested to be in the region of 50 to 60 percent in urban areas. This hypothesis was further investigated in a subsequent study (Gatrell et. al., 1991), using data from CPD and Pinpoint register for Camden area of London. The results of this second study also highlighted 61 percent of postcodes, which were misallocated to EDs. This higher rate of misallocation was contributed to the smaller size of EDs in Camden area. The study demonstrated that the addition of 50 metres to the x and y grid co-ordinates in the CPD lowers the extent of misallocation from 61 to 38 percent. The accuracy of the digitised ED boundaries was also recognised as a contributory factor to the misallocation. Research carried out by OPCS (1985) also acknowledges the co-ordinate errors in the CPD which appear in the ED/Postcode directory. This showed that 98 percent of all co-ordinates in the CPD lie within 900 metres of their true location, 90 percent are within 400 metres and only 50 percent are within 100 metres. The co-ordinates in the ED/Postcode directory for Newcastle were analysed as part of this study. The results showed that: 87% were within 900 metres, 85% were within 400 metres and 43% were within 100 metres of their true location. This distance could contribute to the allocation of these addresses to the wrong EDs. Some EDs in the West City Ward of Newcastle-upon-Tyne constitute entirely multioccupied buildings with around 90 addresses per building. The result of the misallocation would be gross errors in the aggregate (ED) counts of dwellings.

The literature above suggested two important points, relevant to the present study. The first was that the use of ED/Postcode directory would result in gross errors in the aggregated (ED) counts of dwellings. The second was that the best method for allocating address-based information to EDs would be the point-in-polygon method, using digitised ED boundaries. It was therefore decided to take advantage of the 1metre precision grid co-ordinates, already present in the property registers available to this study. Digitised ED boundaries (ED-Line) were also available in the form of an Arcview coverage from the authority. While the overall aim of this investigation was Census underenumeration of dwellings, exploring the value of existing resources within the authority, feasible integration techniques, and some of the problems that a typical local authority may encounter when embarking on the task of incorporating GIS, was also of significance. Considering the problems discussed above and the partial presence of postcodes in datasets, it was decided to avoid using postcodes as the

link between addresses and EDs. The time and effort necessary to assign postcodes to all records within the datasets would instead be spent on geo-referencing attribute data files by address matching. Although this was very time consuming, the final allocation of address-based data to EDs would be more reliable. Work therefore progressed to ensure the accuracy of grid co-ordinates in both property registers (Section 3.4.1). In seeking errors of this kind in the LPG Gazetteer the address co-ordinates in this file were compared to their associated postcode co-ordinated in the ED/Postcode directory. This process also established the extent of postcode errors in the LPG Gazetteer and co-ordinate errors in the ED/Postcode directory for Newcastle-upon-Tyne.

The addresses in the LPG Gazetteer were grouped together by postcode sector (the first four digits of the postcode unit), and displayed in Arcview in unique colours. Initial inspections revealed several addresses located at more than 1000 metres away from their suggested location in the ED/Postcode directory. More detailed inspections revealed two reasons for this apparent misplacement. Some addresses were in the right location but had the wrong postcode sectors, others had correct postcode sectors, but were in the wrong location. Both sets of addresses therefore appeared somewhere outside their associated cluster. In order to separate these records, the distance between the location (in the LPG Gazetteer) of each address and the corresponding postcode in the Ed/postcode directory was calculated. Around 18% of LPG Gazetteer records with postcode or grid co-ordinate errors were separated into a database and checked. These comprised addresses that were 500m or more away from the location of their associated postcode in the ED/Postcode directory, and those addresses with assigned postcodes that could not be located in the 1991 or the 1995 ED/Postcode directory. This was due to clerical postcode errors in the LPG Gazetteer, and the absence of correct postcodes in the ED/Postcode directory. The remaining 86% of the addresses in the gazetteer were within 500m of their corresponding postcode in the ED/Postcode directory and had correct co-ordinates. In attempting to correct and complete postcodes in the LPG Gazetteer and PAF 1991, GEOPLAN[6] boundaries were used. A 'point in polygon' overlay of digitised postcode boundaries and the LPG addresses (converted to shapefile) within Arcview highlighted several discrepancies. The postcode areas in GEOPLAN did not coincide with the postcodes correctly assigned to addresses in the

LPG Gazetteer. The use of this product therefore, would have further complicated the process.

3.3.7 Errors in the LPG Gazetteer address co-ordinates

The process of comparing postcode co-ordinates in the LPG Gazetteer to those in the ED/Postcode directory detailed above highlighted approximately 6,000 addresses (5%) in the LPG Gazetteer with grid co-ordinate errors which were corrected and the City Council's Planning Department were informed. These were mainly due to clerical errors where addresses with identical street names were assigned with incorrect co-ordinates. The Tyne and Wear Research and Intelligence Unit (TWRIU) confirmed this to be one of the problems which was to be dealt with together with the Planning Department.

3.3.8 Problems associated with digitised ED boundaries

Considering all the available options of spatial representation, use of EDs within this research project provided a 'safe' reporting area for confidential Census and non-Census data. EDs provided a guiding framework in locating any emerging patterns or large discrepancies between the Census and housing data (Morphet, 1993a; Morphet, 1993b). These areas were then explored in detail, using the available sub-ED level housing data, digitised ED boundaries and digitised boundaries of selected housing estates in Newcastle-upon-Tyne.

3.4 Chapter Summary

This together with Chapter 4 aimed to contribute to the literature, advocating the potential benefits of local authority data and the combination of this with Census data in both research and policy (Chapter 2 – Section 2.2). Known problems of data integration were illustrated through detailed descriptions of data sources, terms, definitions, referencing schemes and maintenance procedures within the authority. The underlying data collection processes were investigated in order to find potential

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[6] Postcode unit boundaries based on the Ordnance Survey Maps digitised by GEOPLAN.

sources of error and possible reasons for the differences in vacant, occupied and total dwelling figures detailed in Chapters 5 and 6. Census information about dwelling type, tenure and occupancy were found to be scattered among eight tables, but only three tables provided figures comparable to those from the local authority. Inconsistencies between definitions were noted as possible reasons for the observed differences in Chapters 5 and 6. Halls of residence for example, appeared in the 1995 Gazetteer as one record per building, while the 1991 vacant properties and council tax databases recorded the individual flats within these halls. The 1991 Census determined communal establishments through their catering facilities.

The problems experienced during the geo-referencing process were listed and found to be closely related to problems of GIS implementation within the authority. Data integration methods and the lack of efficient resource management in the authority, were found to be the major obstacles. For example, duplication of effort in the maintenance and updating of the City's Property Gazetteer, which was carried out by both the Planning Department and TWRIU. Several methods of joining databases and address matching were used in search of a fully automated solution. The implications of the findings in this chapter are discussed more fully in Chapter 7 (Section 7.2).

Chapter 4 Data Collection and Interpretation

Chapter Overview

This chapter identifies comparable variables, derived from the local authority data and the 1991 Census and describes the methods used in interpreting datasets. It also identifies the sources of discrepancies between these datasets, which relate to definitions, data management procedures and data collection purposes. Following a brief introduction in section 4.1, the selected variables are listed in section 4.2 and the methods of constructing figures for the variables are described in sections 4.3 and 4.4. In section 4.3 the validity of figures derived from the local authority datasets are checked by comparisons with figures from other sources in the authority. Section 4.5 summarises the main findings, which are discussed in Chapter 7 (Section 7.3).

4.1 Introduction

The identification of comparable figures from the 1991 Census and the local authority data involved understanding data sources, data collection methods and maintenance procedures. In the case of local authority data, this was often tied in with the understanding of the structures and internal operations of the authority. It was found that inconsistent definitions, data management procedures, computer systems and data collection purposes often contributed to the systematic differences between the Census and local authority figures. There were equally significant uncertainties associated with the Census figures. These originated from some of the fundamental terms used in these tables. The most important terms such as 'households' were not fully understood by residents, as illustrated by the extract below, taken from the 1994 CVS report:

'I didn't know what was meant by household. All the people on my floor use the same bath and shower, and I thought we were a household because nobody from outside comes in to use the bath.'

(Heady et al., 1994)

This chapter identifies the comparable variables from the Census and the local authority data and constructs the figures from each data source. The processes of constructing local authority figures involved validating the dataset figures by comparing them with those from other local authority sources.

These comparisons were carried out at the District scale and then at Housing Area and Housing Neighbourhood resolutions. In doing so, the chapter also explores the potential uses of local authority data for GIS-based spatial analysis and the integration of this with Census data. The potential sources of error and discrepancies between these data sources are noted and the implications of these for both research and policy purposes are discussed in Chapter 8 (Section 8.3).

4.2 Comparable variables

The variables selected for the investigation were:

- Vacant residential dwellings (all tenures), as at 21/04/91
- Occupied council housing stock
- Residential dwellings (Both occupied and vacant)

Although figures for vacant council stock and hence the total council housing stock (both occupied and vacant) were not available from the Census, the figures for total council stock available from the local authority were compared (Table 4.1). The constructed figures from the datasets (such as the council properties and the vacant properties databases) were compared with those from the 1990/91 Housing Annual report, and the Housing Department's computer printouts. This was carried out in order to validate the constructed dataset figures.

	Local authority data			**1991 Census**	
Variable	**LA. source 1** Datasets	**LA. source 2** Housing Annual Reports	**LA. source 3** Computer Printouts	**Census tables**	**Census table Description**
Council housing stock	Council Properties database + Old properties – Sheltered Accommodation	1990/91 Housing Annual Report	N/A	N/A	N/A
Vacant residential dwellings	1991 Vacant properties database	1990/91 Housing Annual Report	Printouts dated 26/4/91 & 05/4/91	LBS/SAS 61	Vacant Dwellings plus vacant second homes
Occupied council housing stock	Council Properties database + Old properties – L.A vacancies	Total council stock: vacant property counts	N/A	LBS/SAS 62	Local authority rented dwellings with residents
Total Residential Dwellings	1995 LPG Gazetteer	N/A	N/A	LBS/SAS 62	Dwellings of all occupancy (vacant and occupied)

Table 4.1 Selected variables for the analysis

4.2.1 Aggregation of local authority datasets

Local authority district figures were obtained by the aggregation of records within individual datasets (listed in Table 4.1 and Chapter 3 – Section 3.2.2). Figures for Housing Areas, Housing Neighbourhoods, Wards and EDs were the sum of records in each area, using the point-in-polygon procedure within Arcview. These aggregated figures, which in this study are referred to as the 'dataset figures', were maintained within four separate shapefiles for each of the four resolutions. Databases were converted to shapefiles and used together with the O.S. maps, which also held some basic information about properties. Several items of information were gathered in this way, and added as attributes to these shapefiles.

4.3 Construction of comparable figures from local authority sources

Local authority figures for occupied, vacant and total council stock were available from several sources including the datasets. The figures for each variable were compared at the District scale and at Housing Area and Housing Neighbourhood resolution, in order to asses the validity of the dataset figures and highlight the areas with the greatest differences. The observations made about these comparisons helped explain the differences between the local authority dataset figures and the Census figures in Chapters 5 and 6.

4.3.1 Local Authority Data: 1991 council housing stock (occupied and vacant)

District Scale: 1991 council housing stock

The dataset figure of total council stock (41550) was the number of 1995 council stock (39158) plus demolished/disposed properties since 1991 (2392). The total number of housing stock at the end of 1990/91 financial year, according to the 1990/91 Housing Annual Report, was reported as 42210. The difference of 660 (1.6%) was investigated further at Housing Area and Housing Neighbourhood resolutions. Both figures included local authority owned sheltered accommodation (921).

Housing Areas : 1991 council housing stock

The 1990/91 Housing Annual report recorded more properties than the datasets, in all Housing Areas except Blakelaw (Figure 4.1). Figures in Benwell were similar (-7),

suggesting that the dataset figures were close approximations of those in the housing report (Table 4.2). The largest shortfall of dataset council stock figures was in Gosforth/Byker/Heaton/Shieldfield (G/B/S/H) Housing Area (-303).

Area	Council Properties database	Old properties database	1991 council stock from datasets	1991 council stock from 1990/91 HA report	Difference: Datasets - HA report	Difference as % of dataset figures
Blakelaw	8305	772	9077	8951	126	1.39%
Benwell	4193	845	5038	5045	-7	-0.14%
Walker	7857	112	7969	8084	-115	-1.44%
Cruddas Park	3917	228	4145	4306	-161	-3.88%
Newburn/ Westerhope	7302	270	7572	7796	-224	-2.96%
G/B/H/S	7560	165	7725	8028	-303	-3.92%
City-wide totals[7]	39134	2392	41526	42210	-684	-1.65%

Table 4.2 Housing Areas: Difference in local authority 1991 council housing stock figures

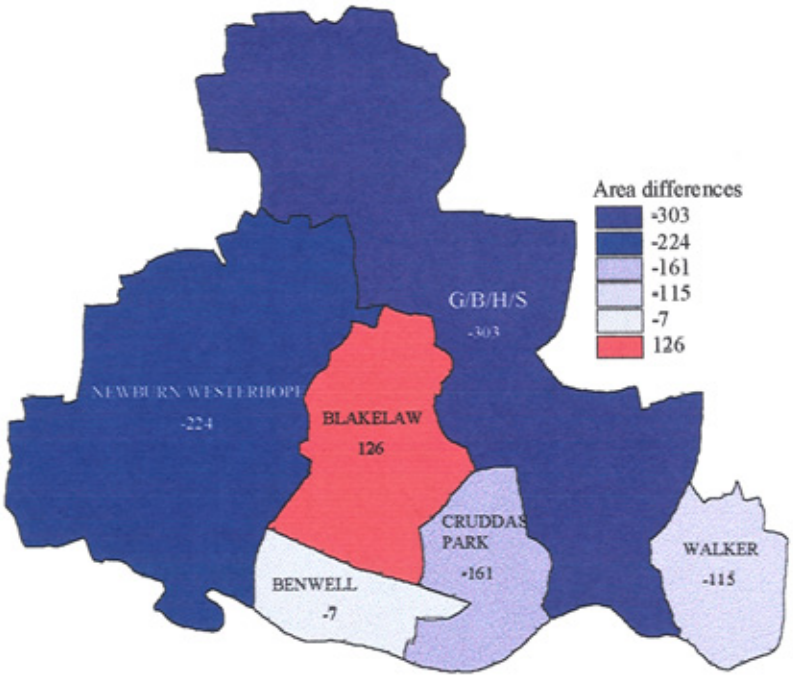

Figure 4.1 Housing Areas: Difference in council stock: Dataset figures – Housing Annual report figures

Housing Neighbourhoods: 1991 council housing stock

Although the Housing Area figures in Benwell were similar, Housing Neighbourhood figures in South Benwell (-29%) and Elswick (25%) varied significantly. The dataset figures of council stock in Blakelaw were higher than those from the Housing Annual report in all its constituent Neighbourhoods, except Fenham (Figure 4.2).

[7] Some records were without grid references

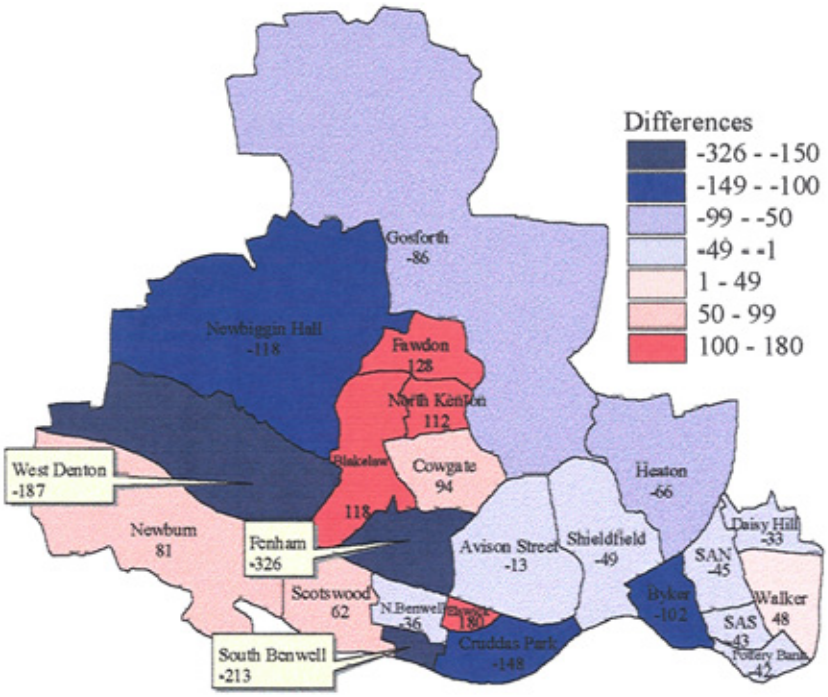

Figure 4.2 Housing Neighbourhoods: Difference in council stock figures: Datasets – Housing Annual report

Area	Neighbourhood	Council Properties database	Old properties database	1991 housing stock from datasets	1991 housing stock from 1990/91 HA report	Difference: Datasets - HA report	Difference as % of dataset figures
Blakelaw	Fenham	1238	26	1264	1590	-326	-25.79%
Benwell	South Benwell	567	159	726	939	-213	-29.34%
Newburn/ Westerhope	West Denton	2386	49	2435	2622	-187	-7.68%
Cruddas Park	Cruddas Park	2382	87	2469	2617	-148	-5.99%
Newburn/ Westerhope	Newbiggin Hall	2230	128	2358	2476	-118	-5.00%
G/B/H/S	Byker	2760	8	2768	2870	-102	-3.68%
G/B/H/S	Gosforth	1653	43	1696	1782	-86	-5.07%
G/B/H/S	Heaton	1193	23	1216	1282	-66	-5.43%
G/B/H/S	Shieldfield	1954	91	2045	2094	-49	-2.40%
Walker	St Anthony's North	1872	15	1887	1932	-45	-2.38%
Walker	St Anthony's South	2007	34	2041	2084	-43	-2.11%
Walker	Pottery Bank	1454	28	1482	1524	-42	-2.83%
Benwell	North Benwell	1162	21	1183	1219	-36	-3.04%
Walker	Daisy Hill	1036	4	1040	1073	-33	-3.17%
Cruddas Park	Avison Street	1535	141	1676	1689	-13	-0.78%
Walker	Walker	1488	31	1519	1471	48	3.16%
Benwell	Scotswood	1843	578	2421	2359	62	2.56%
Newburn/ Westerhope	Newburn	2686	93	2779	2698	81	2.91%
Blakelaw	Cowgate	1554	292	1846	1752	94	5.09%
Blakelaw	North Kenton	1398	168	1566	1454	112	7.15%
Blakelaw	Blakelaw	3059	41	3100	2982	118	3.81%
Blakelaw	Fawdon	1056	245	1301	1173	128	9.84%
Benwell	Elswick	621	87	708	528	180	25.42%
City-wide totals		39134	2392	41526	42210	-684	-1.65%

Table 4.3 Housing Neighbourhoods: Difference in council stock figures

Dataset figures in fifteen Neighbourhoods were less than those from the Housing Annual report (Table 4.3). The shortfalls ranged from –13 (-1%) in Avison Street to -

213 (-29%) in South Benwell. The opposite pattern was observed in eight Neighbourhoods, where the dataset excess ranged from 48 (3%) in Walker to 180 (25%) in Elswick.

4.3.2 Local Authority Data: Vacant residential dwellings

Vacant residential dwellings was one of the comparable variables with figures available from both the Census and the local authority data. The only available local authority figure for this variable was obtained from the 1991 vacant properties database, which included vacancies across all tenures. The District figure (9116) was far greater than that from the Census tables (6858). In preparation for the comparison with the Census figures in Chapter 5, local authority vacancies in this database were identified and the figure was compared with the figures in the Housing Annual reports and the computer printouts. These printouts were maintained for the purpose of preparing the necessary information for the Housing Annual reports (Chapter 3 – Section 3.2.2). This comparison also provided some explanation for the large difference in the total number of vacancies, especially for those areas where there were multi-occupied dwellings.

Local Authority Data: Local authority vacant dwellings

This section focuses on the comparison of local authority vacant dwellings from three sources of information, all of which were from the local authority. These were the Housing Annual reports, the 1991 vacancy database and the Housing Department's internal records in the form of computer printouts. The Housing Annual reports provided vacancy figures for the District and the constituent Housing Areas and Housing Neighbourhoods. These included vacancies in sheltered accommodation. The computer printouts provided vacancy figures by housing estates which were aggregated to provide figures for Housing Neighbourhoods. These printouts also provided a detailed breakdown of vacant properties available for relet, undergoing capital repairs, improved for sale, disposed to housing associations, disposed by other means or demolished. Two sets of printouts were available providing figures as at 5th and 26th of April 1991. Vacancy figures from all three sources therefore, did not refer to the same time and the purposes for which they were prepared differed.

District Scale: Local authority vacant dwellings

The 1991 vacant properties database did not distinguish between tenures and was therefore joined to the council and old properties databases (using the common CPM property ID number) to identify council owned vacant properties on Census night (Table 4.4 and Figure 4.3). A total of 2176 vacancies were identified and flagged in the 1991 vacant properties database (1559 in the council properties database and 617 in the old properties database). This figure was compared to those from the 1990/91 Housing Annual report (1886) and the computer printouts (2165).

A	B	C	C-A	C-B
1990/91 Housing Annual Report	Printouts 26/04/91	1991 vacant properties database	Difference with HA Report.	Difference with printout
1886	2165	2176	290	11

Table 4.4 Comparison of vacant council stock in the City from the 1990/91 Housing Annual Report, printouts and the 1991 Vacant properties database

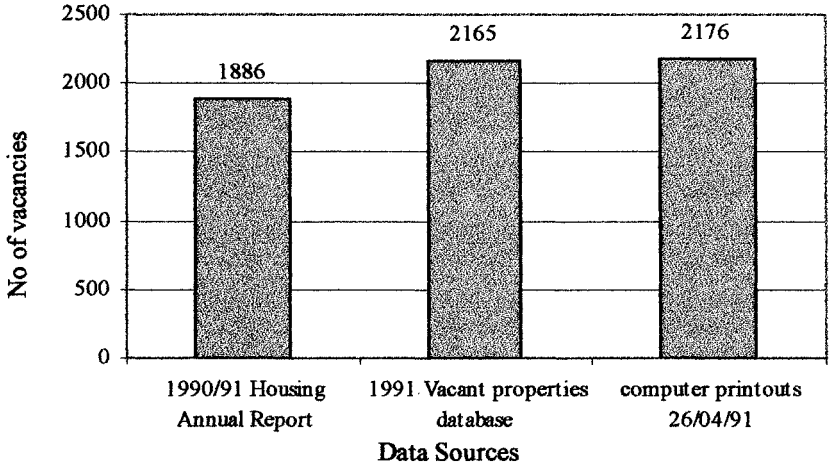

Figure 4.3 Comparison of vacancy figures in the City from local authority sources

Housing Areas: Local authority vacant dwellings

The 1991 vacancy database figures were more than those reported by the 90/91 Housing Annual report in all Housing Areas except Benwell (Table 4.5). Dataset vacancy figures in Benwell were lower than the figures from the housing report and the computer printouts in this area (Figure 4.4 and 4.5). The dataset figures closely matched those from the computer printouts in Cruddas Park and Blakelaw but were more than the

figures from the other sources in Walker, G/B/H/S and Newburn/Westerhope (Figure 4.6).

	A	B	C	D	E			
Area	1989/90 Housing Annual Report	1990/91 Housing Annual Report	1991 Vacant properties database 21/04/91	Printouts 05/04/91	Printouts 26/04/91	C-B Diff with HA rep	Diff as % of dataset figures	C-E Diff with printout
Benwell	542	667	466	674	695	-201	-43%	-229
Cruddas Park	712	489	519	547	559	30	6%	-40
Walker	211	157	236	154	165	79	34%	71
G/B/H/S	123	82	166	78	77	84	51%	89
Newburn/ Westerhope	232	175	303	173	182	128	42%	121
Blakelaw	635	316	486	496	487	170	35%	-1
City totals	2455	1886	2176	2122	2165	290	13%	11

Table 4.5 Housing Areas: Differences in vacancy counts

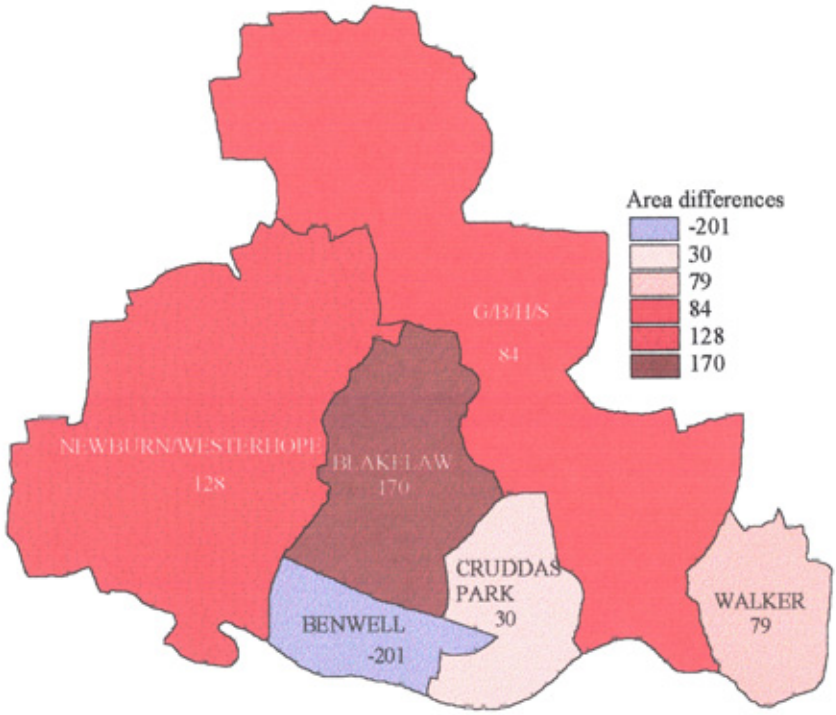

Figure 4.4 Housing Areas: Difference between vacancy figures: 1991 Vacant properties database - Housing Annual report figures

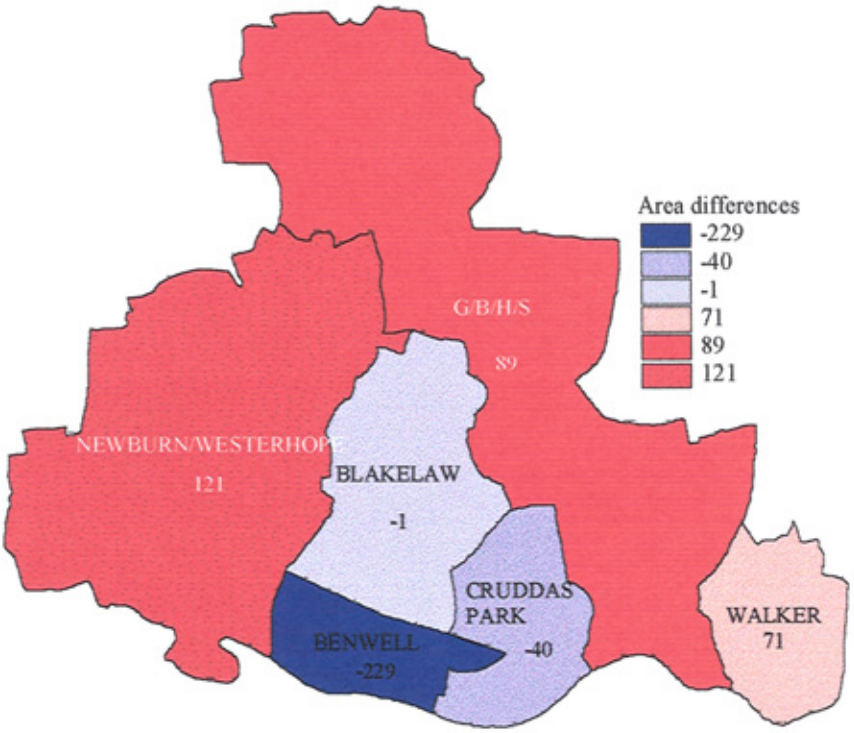

Figure 4.5 Housing Areas: Difference between vacancy figures: 1991 Vacant Properties database - computer printouts

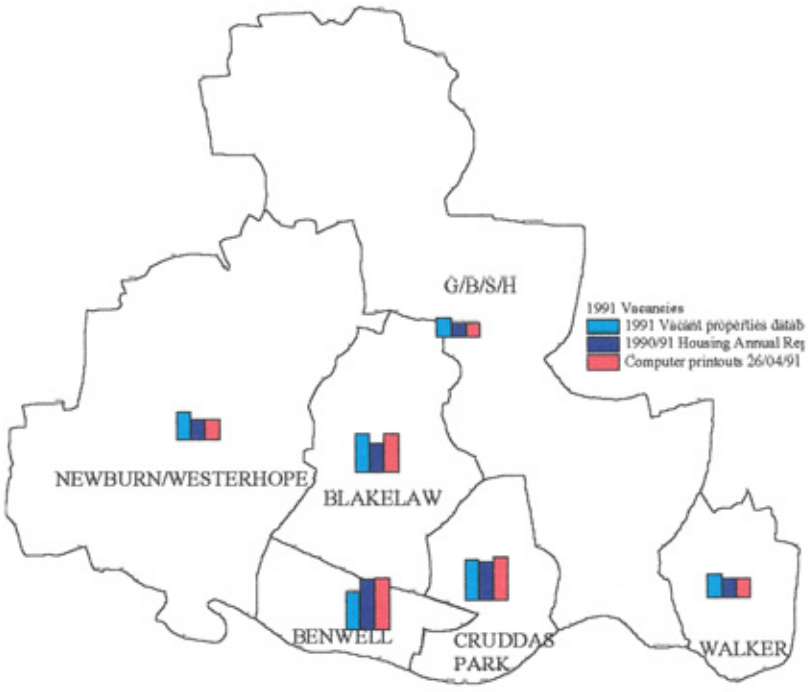

Figure 4.6 Housing Areas: Comparison of vacancy figures: 1991 Vacant properties database, 1990/91 Housing Annual Report and computer printouts (26/04/91)

The large dataset shortfall of vacancies in comparison with the figures in both the Housing Annual report and the computer printouts was further investigated (Table 4.6).

The difference between the number of vacancies in Benwell was mainly due to the differences in figures relating to two categories of vacant properties:

Sold council properties

The Housing Annual report recorded 148 sales while there were only 5 properties sold according to the internal computer printouts. This may be due to the timing to which these sources refer. The figures in the 90/91 HA report were compiled up to six months after the end of each financial year.

Properties available for relet

The number of properties available for occupancy according to the printouts was 631 while the housing report only accounted for 460.

	Printouts Available for Relet		Housing Reports Available for Relet		Printouts Capital Repairs		Housing Reports Capital Repairs		Printouts Sales		Housing Reports Sales		Printouts - Demolished		Printouts Total vacant		Housing Reports Total vacant		1991 Vacant Properties Database	Differences between 1991 Vacancy Dbase and other sources	
	05/04/91	26/04/91	90/91	89/90	05/04/91	26/04/91	90/91	89/90	05/04/91	26/04/91	90/91	89/90	05/04/91	26/04/91	05/04/91	26/04/91	90/91	89/90	Total Vacant as at 21/04/91	Diff with HA rep	Diff with printout
Blakelaw	304	294	248	385	4	3	13	157	188	190	55	93	0	0	496	487	316	635	486	170	-1
Benwell	**610**	**631**	**460**	**430**	**59**	**59**	**59**	**108**	**5**	**5**	**148**	**4**	**0**	**0**	**674**	**695**	**667**	**542**	**466**	**-201**	**-229**
Walker	152	163	153	147	2	2	4	64	0	0	0	0	0	0	154	165	157	211	236	79	71
Cruddas Park	484	495	489	535	0	0	0	166	52	63	0	11	1	1	547	559	489	712	519	30	-40
Newburn	156	158	159	149	17	24	16	83	0	0	0	0	0	0	173	182	175	232	303	128	121
G/B/H/S	76	75	81	114	2	1	1	7	0	1	0	2	0	0	78	77	82	123	166	84	89
Grand Total	1782	1816	1590	1760	84	89	93	585	245	259	203	110	1	1	2122	2165	1886	2455	2176	290	11

Table 4.6 Vacant Properties by Area, according to the 1991 Vacant Properties Database, Housing Annual Reports and Printouts

Housing Neighbourhoods: Local authority vacant dwellings

In Benwell, the shortfall of 201 vacancies by the datasets, was distributed between four Neighbourhoods, the majority of which were in South Benwell (Figure 4.7 and 4.8). Table 4.7 summarises vacancy differences for all Neighbourhoods.

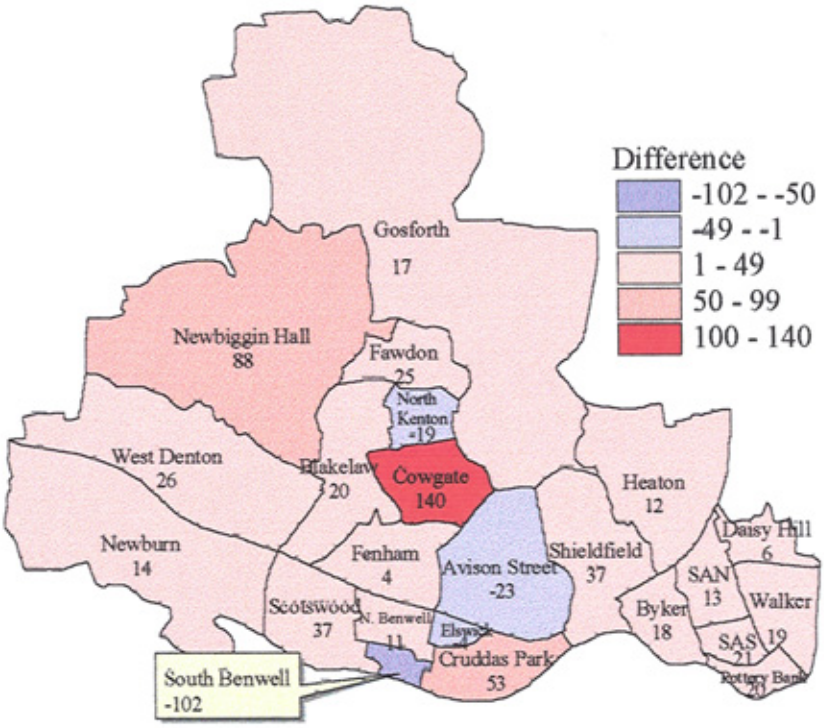

Figure 4.7 Housing Neighbourhoods: Difference between vacancy figures: 1991 Vacant properties database – 1990/91 Housing Annual report

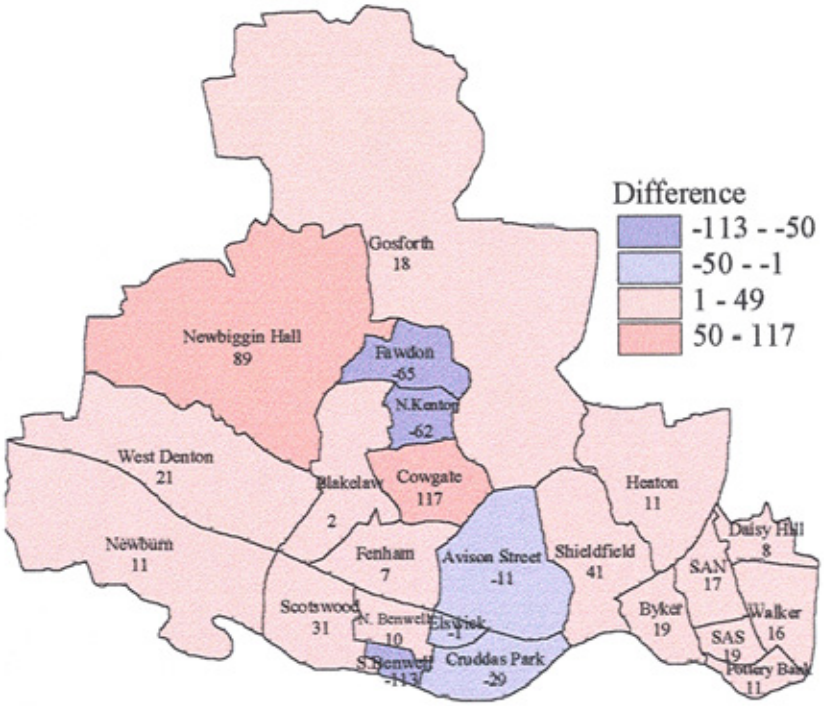

Figure 4.8 Housing Neighbourhoods: Difference between vacancy figures: 1991 Vacant properties database - computer printouts

Housing N.hood	Printouts Available for Relet		HA Report Available for Relet		Printouts Capital Repairs		HA Reports Capital Repairs		Printouts Sales		HA Report Sales		Printouts - Demolished		Printouts Total vacant		HA Report Total vacant		1991 Vacant Properties Dbase	Diff. 91vdbase – HA	Diff as % of dataset figure	Diff 91vdbase – P.O.
	05/04/91	26/4/91	90/91	89/90	05/04/91	26/4/91	90/91	89/90	05/04/91	26/4/91	90/91	89/90	05/04/91	26/4/91	05/04/91	26/4/91	90/91	89/90	Total Vacant	HA rep	% diff	Print-outs
Daisy Hill	12	11	13	5	0	0	0	1	0	0	0	0	0	0	12	11	13	6	19	6	31.6%	8
Pottery Bank	110	120	111	128	0	0	0	17	0	0	0	0	0	0	110	120	111	145	131	20	15.3%	11
St.Anthony's S.	19	15	13	2	0	0	0	2	0	0	0	0	0	0	19	15	13	4	34	21	61.8%	19
St.Anthony's North	5	6	8	3	2	2	4	26	0	0	0	0	0	0	7	8	12	29	25	13	52.0%	17
Walker	6	11	8	9	0	0	0	18	0	0	0	0	0	0	6	11	8	27	27	19	70.4%	16
Gosforth	17	17	19	19	1	0	0	0	0	1	0	0	0	0	18	18	19	19	36	17	47.2%	18
Byker	29	27	28	32	0	0	0	0	0	0	0	0	0	0	29	27	28	32	46	18	39.1%	19
Heaton	4	6	5	63	1	1	1	7	0	0	0	2	0	0	5	7	6	72	18	12	66.7%	11
Shieldfield	26	25	29		0	0	0		0	0	0		0	0	26	25	29		66	37	56.1%	41
Cruddas Park	406	412	394	480	0	0	0	166	52	63	0	6	1	1	469	476	394	652	447	53	11.9%	-29
Avison Street	78	83	95	55	0	0	0	0	0	0	0	5	0	0	78	83	95	60	72	-23	-31.9%	-11
Blakelaw	69	61	43	48	1	0	0	0	0	0	0	0	0	0	70	61	43	48	63	20	31.7%	2
Fenham	16	13	16	15	1	1	1	2	0	0	0	0	0	0	17	14	17	17	21	4	19.0%	7
Cowgate	101	104	120	119	2	2	2	113	39	39	0	1	0	0	142	145	122	233	262	140	53.4%	117
Fawdon	11	9	11	20	0	0	0	0	92	92	0	92	0	0	103	101	11	112	36	25	69.4%	-65
North Kenton	107	107	58	183	0	0	10	42	57	59	55	0	0	0	164	166	123	225	104	-19	-18.3%	-62
Newburn	38	45	41	27	5	3	4	6	0	0	0	0	0	0	43	48	45	33	59	14	23.7%	11
Newbiggin Hall	88	80	90	100	6	15	6	75	0	0	0	0	0	0	94	95	96	175	184	88	47.8%	89
Westerhope/ West Denton	30	33	28	22	6	6	6	2	0	0	0	0	0	0	36	39	34	24	60	26	43.3%	21
North Benwell	18	21	20	17	6	6	6	14	0	0	0	0	0	0	24	27	26	31	37	11	29.7%	10
Ferguson's Lane	142	148	137	89	6	6	6	8	2	2	0	0	0	0	150	156	143	97				
Scotswood	209	216	210	121	4	4	4	4	0	0	0	0	0	0	213	220	214*	125	251	-106	-42.2%	-125
Elswick	49	50	54	41	43	43	43	54	1	1	0	1	0	0	93	94	97	96	93	-4	-4.3%	-1
South Benwell	**192**	**196**	**39**	**162**	**0**	**0**	**0**	**28**	**2**	**2**	**148**	**3**	**0**	**0**	**194**	**198**	**187**	**193**	**85**	**-102**	-120.0%	-113
Totals	1782	1816	1590	1760	84	89	93	585	245	259	203	110	1	1	2122	2165	1886	2455	2176	290	13.3%	11

- Ferguson's Lane became part of Scotswood Neighbourhood in 1992, the associated figures for these area were therefore summed.

Table 4.7 Vacant Properties by Neighbourhood, according to the 1991 Vacant Properties Database, Housing Annual Reports and Printouts

4.3.3 Local Authority Data: 1991 occupied council housing stock

District Scale: 1991 Occupied council housing stock

The second comparable variable was 'occupied council housing stock'. The dataset figure for occupied council stock (39374) was slightly (1.6%) lower than that in the 1990/91 Housing Annual report (40324). Both these figures included sheltered accommodation (Table 4.8) and were obtained by subtracting the number of local authority owned vacant properties from the total figure of local authority stock.

Variable	Datasets: A	1991 Housing Annual Report B	Difference A-B
Council properties database (1995)	39158		
Old properties database	2392		
1991 Council stock	**41550**	**42210**	**-660 (-1.6%)**
LA Vacant properties in council properties database	1559		
Vacant properties in old properties database	617		
Total L.A. vacant stock from the 1991 Vacant properties database	**2176**	**1886**	**290 (13.3%)**
Occupied council housing stock (1991)	39374	40324	-950 (24.1%)

Table 4.8 District Scale: Calculation of occupied council stock from local authority sources

Housing Areas: 1991 Occupied council housing stock

The overall underestimation of occupied council stock by datasets was distributed in 5 Housing Areas (Figure 4.9). Benwell was the only area where the dataset figure was more than the figure in the Housing Annual report.

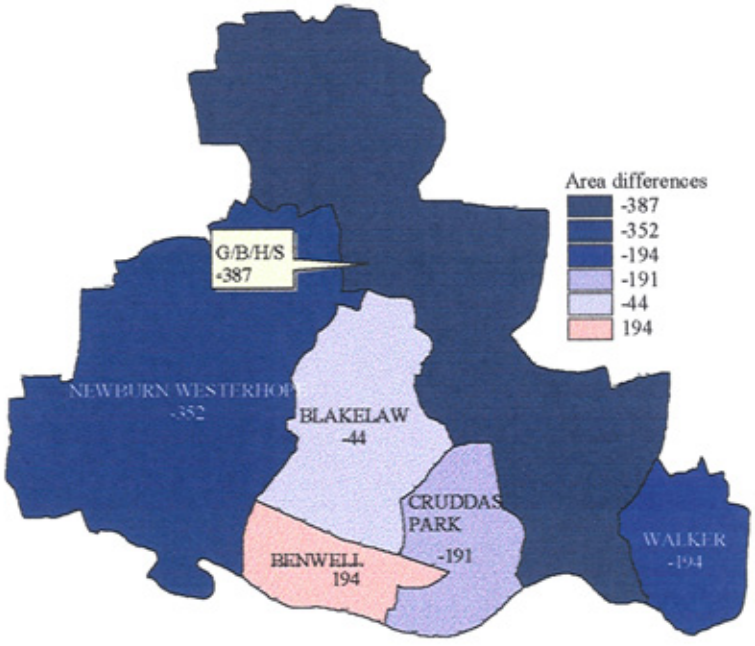

Figure 4.9 Housing Areas: Distribution of differences between occupied council stock figures: Dataset figures – 1991 Housing Annual report figures

	Datasets					1990/91 Housing Annual Report			Difference	
Area	Cprop dbase	Oldprop dbase	Datasets: Council Stock	1991 Vacant property database	Datasets: Occupied Council Stock	1990/91 HA: Council Stock	1990/91 HA: Vacant dwellings	1990/91 HA: Occupied Council Stock	Data - HA	Difference as % of Dataset figures
Benwell	**4193**	**845**	**5038**	**466**	**4572**	**5045**	**667**	**4378**	**194**	**4.24%**
Blakelaw	8305	772	9077	486	8591	8951	316	8635	-44	-0.51%
Cruddas Park	3917	228	4145	519	3626	4306	489	3817	-191	-5.27%
Walker	7857	112	7969	236	7733	8084	157	7927	-194	-2.51%
Newburn/ Westerhope	7302	270	7572	303	7269	7796	175	7621	-352	-4.84%
G/B/H/S	7560	165	7725	166	7559	8028	82	7946	-387	-5.12%
City totals	39134	2392	41526	2176	39350	42210	1886	40324	-974	-2.48%

Table 4.9 Housing Areas: Comparison of 1991 Occupied council housing stock figures: Dataset figures – Housing Annual report figures

Housing Neighbourhoods: 1991 Occupied council housing stock

The same pattern of underestimation by the datasets was repeated in 15 Neighbourhoods (Figure 4.10 and Table 4.10). There were more occupied council stock according to the datasets than the housing report, in 8 Neighbourhoods, including Scotswood (168) and Elswick (184).

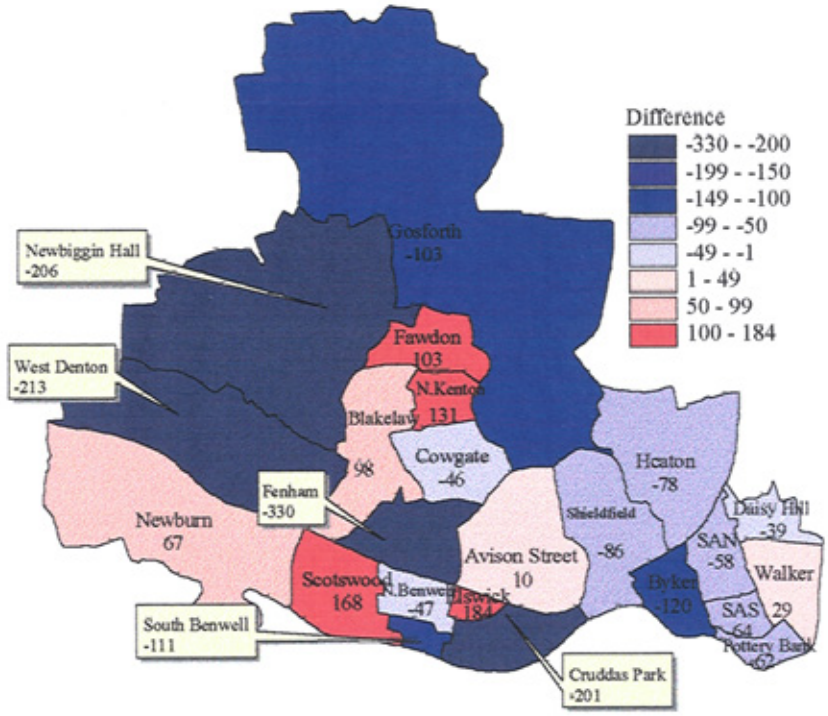

Figure 4.10 Housing Neighbourhoods: Distribution of differences between occupied council stock figures: Dataset figures – Housing Annual report figures

	Dataset figures					90/91 Housing Annual report			Difference	
Housing Neighbour-hood	Cprop dbase	Oldprop dbase	Council Stock	1991 Vac property database	Occupied Council Stock	Council Stock	Vacant dwellings	Occupied Council Stock	Data-HA	Diff. as % of dataset figures
Elswick	621	87	708	93	615	528	97	431	184	29.92%
Scotswood	1843	578	2421	251	2170	2359	357	2002	168	7.74%
North Kenton	1398	168	1566	104	1462	1454	123	1331	131	8.96%
Fawdon	1056	245	1301	36	1265	1173	11	1162	103	8.14%
Blakelaw	3059	41	3100	63	3037	2982	43	2939	98	3.23%
Newburn	2686	93	2779	59	2720	2698	45	2653	67	2.46%
Walker	1488	31	1519	27	1492	1471	8	1463	29	1.94%
Avison Street	1535	141	1676	72	1604	1689	95	1594	10	0.62%
Daisy Hill	1036	4	1040	19	1021	1073	13	1060	-39	-3.82%
Cowgate	1554	292	1846	262	1584	1752	122	1630	-46	-2.90%
North Benwell	1162	21	1183	37	1146	1219	26	1193	-47	-4.10%
St Anthony's North	1872	15	1887	25	1862	1932	12	1920	-58	-3.11%
Pottery Bank	1454	28	1482	131	1351	1524	111	1413	-62	-4.59%
St Anthony's South	2007	34	2041	34	2007	2084	13	2071	-64	-3.19%
Heaton	1193	23	1216	18	1198	1282	6	1276	-78	-6.51%
Shieldfield	1954	91	2045	66	1979	2094	29	2065	-86	-4.35%
Gosforth	1653	43	1696	36	1660	1782	19	1763	-103	-6.20%
South Benwell	567	159	726	85	641	939	187	752	-111	-17.32%
Byker	2760	8	2768	46	2722	2870	28	2842	-120	-4.41%
Cruddas Park	2382	87	2469	447	2022	2617	394	2223	-201	-9.94%
Newbiggin Hall	2230	128	2358	184	2174	2476	96	2380	-206	-9.48%
West Denton	2386	49	2435	60	2375	2622	34	2588	-213	-8.97%
Fenham	1238	26	1264	21	1243	1590	17	1573	-330	-26.55%
City totals	39134	2392	41526	2176	39350	42210	1886	40324	-974	-2.48%

Table 4.10 Housing Neighbourhoods: Comparison of 1991 Occupied council housing stock figures: Dataset figures – Housing Annual report figures

4.3.4 Local Authority Data: Residential dwellings

The third comparable variable was 'total residential dwellings' (both occupied and vacant) with figures available from both the Census (119767) and the local authority (120215). The local authority figure was obtained from the Planning Department's 1995 Gazetteer and was compared to the Census figure (in Chapter 5 - Section 5.2.3). Although alternative local authority District figures for 1991 (128448) and 1994 (121177) were provided by the TWRIU, the proportion of business and residential addresses in 1991 were not available (Table 4.11).

	Data Source		
Type of accommodation	Gazetteer (1995)	TWRIU (1991)	TWRIU (1994)
Businesses	8434	N/A	8831
Residential Addresses	**120215**	N/A	**121177**
Communal establishments	42		
Unknown	1772		
Total	130463	128448	130008

Table 4.11 Local authority data: The total number of residential addresses in the City

The estimated number of residential addresses in 1991 (120215), was obtained from a subset of the total addresses in the 1995 Gazetteer (130463). These included occupied and vacant residential addresses, communal establishments, businesses and second homes. As the original gazetteer did not differentiate between different address types, residential addresses were identified using this and other datasets. Tenure information in the gazetteer distinguished between local authority, housing association and privately owned residential addresses. Other datasets also helped identify residential addresses, once joined to the gazetteer (detailed in Appendix 3). These were the council properties database, the old properties database (ex council housing stock), the vacant properties database, the 1998 Council Tax database and the 1991 housing benefit data. Businesses were identified using the information in the O.S. LandLine, O.S. A-Z raster maps and the 1997 Gazetteer, which included business names.

As well as the identification of residential and business addresses, the 1995 Gazetteer and other datasets were joined in order to obtain information about dwelling structure, tenure and occupancy (Table 4.12). For example, the 1997 Gazetteer was used to distinguish the addresses within communal establishments. These included residential homes for the elderly and halls of residence. It was noted that the basic address details presented in property gazetteers could not determine whether these were classified as communal establishments or private addresses in the 1991 Census. The effects of definitional differences, such as this, on the observed differences between local authority and Census figures were further investigated at the ED resolution (Chapter 6). The information obtained from other datasets was added to the 1995 Gazetteer in the form of additional fields to this database. Addresses were labelled in this way under four categories. These were businesses (8434), residential addresses (120216), communal establishments (42) and unknown (1772). The benefits of 'value-added' dataset are discussed in Chapter 7 (Section 7.3).

Information	Data source
Dwelling Use: Business/Residential	1995 LPG Gazetteer (blank code field) 1997 LPG Gazetteer Council properties database Old properties database 1991 vacant properties database 1998 Council Tax database 1991 housing benefit database
Dwelling Tenure: Whether the property was owned by the local authority, housing association or private Whether the property was a local authority owned property in 1991	1995 Gazetteer (Code fields 1,2 and 3) Council properties database Old properties database (End of tenancy date)
Dwelling Type: What was the structure (e.g. flat, house, bedsit) of the property? What was the structure of the council property?	Council Tax 1998 (all residential properties) Structure of council properties database (council properties only)
Dwelling Occupancy: Whether the property was vacant on Census night Dates (from/to) when the property was vacant	1991 vacant properties database
Other information: Whether the property was standing on Census night?	1991 vacant properties database 1991 Housing Benefit data
The scheme under which the property was disposed/demolished	Old properties database
Whether the property fell within the SRB, City Challenge or Scotswood Renewal Area	City Challenge areas digitised in the housing needs section
The housing estate within which the property was located (West end of Newcastle only)	Digitised housing estate boundaries This information helped identify properties referred to, in the Housing Annual reports in the gazetteer
Whether the property was completed at the end of 1990 calendar year? (Possibility of newly built properties awaiting occupation)	Planning Department's historic records of completed properties at the end of 1990, digitised into a shapefile as part of this study

Table 4.12 Obtaining information about dwelling structure, tenure and occupancy

4.4 Construction of comparable figures from the 1991 Census tables

Census figures for the selected variables were obtained from tables with information about dwelling tenure, type and occupancy (Table 4.13). This section outlines the methods of selecting variables and the construction of comparable figures.

4.4.1 Census Data: 1991 Council housing stock

Census figures for this variable could not be obtained because of the absence of local authority vacant dwelling figures in table LBS64. It was intended to obtain total stock

figures by the addition of occupied local authority dwelling figure (38665) in table LBS/SAS62 to local authority vacant dwelling figure from table LBS64.

4.4.2 Census Data: Vacant residential dwellings

Although vacancy figures relating to both dwellings and household spaces were provided in five Census tables, only those in LBS/SAS61 were used (Tables 4.14 and 4.15). Table LBS64 did not provide ED figures and tables LBS65, LBS/SAS54 and LBS/SAS55 provided figures relating to household spaces rather than dwellings. The total number of vacant residential dwellings (6858[8]), comprised vacant unshared dwellings (6701), shared dwellings (5) and vacant second homes (152). This was compared to the local authority figure (9116), which also included second homes. It was also established that there were 6782 vacant household spaces in 6706 vacant dwellings in the City. These comprised household spaces in unshared vacant dwellings (6701), those in 5 shared vacant dwellings (76) and those classified as 'unattached household spaces' (5). It was not possible to derive the number of local authority rented vacant household spaces as a substitute for vacant dwelling figures. The reasons for this are explained in the following sections.

[8] The number of vacant dwellings in the City varied according to the Census SAS tables (6874) and the LBS tables (6862)

No	Table	Table Name	Dwellings	Hhold spaces	All occupancy	Classification by Tenure	Classification by Type	Same LBS /SAS Structure	No of rooms	Converted / Shared	Shared / Unshared	Shared dwellings	Communal Establishments	Imputed residents	Council housing stock	Vacant Residential Dwellings	Occupied council housing stock	All Residential Dwellings
1	LBS/SAS 54	Occupancy (occupied, vacant and other accommodation):Household spaces, rooms in household spaces; rooms in hotels and boarding houses		√	√			√	√							√		
2	LBS/SAS 55	Household spaces and occupancy: Household spaces in permanent buildings; dwellings		√	√											√		√
3	LBS/SAS 56	Household space type and occupancy: Household spaces		√	√		√	√								√		
4	LBS/SAS 60	Dwellings and household spaces: converted or shared accommodation; dwellings; household spaces; rooms in such accommodation	√	√	√		√		√	√		√				√		
5	LBS/SAS 61	Dwelling type and occupancy: Dwellings; no permanent accommodation	√		√		√								√	•		•
6	LBS/SAS 62	Occupancy and tenure of dwellings: Dwellings with persons present or resident	√			√		√									•	
7	LBS/SAS 63	Dwelling Type and tenure: Dwellings with residents; no permanent accommodation	√			√	√										√	
8	LBS 64	Tenure of dwellings and household spaces: Dwellings; household spaces in dwellings	√	√	√	√					√					√		
9	LBS 65	Occupancy of dwellings and household spaces: Dwellings; household spaces in dwellings	√	√	√						√				√	√		√
10	LBS/SAS 66	Shared dwellings: Shared dwellings; household space in shared dwellings		√	√							√				√		
11	LBS/SAS 03	Communal establishments: Establishments: Persons present not in households											√					
12	LBS/SAS 01	Population bases: Persons present plus absent residents, in households												√				

• - Selected for the analysis √ - Contained relevant information

Table 4.13 Census tables with relevant information about dwelling tenure, type and occupancy

1991 Census Local Base Statistics - 100% Area Identifier - Grid reference -

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Table L61 Dwelling type and occupancy: Dwellings; no permanent accommodation Part 1 of 2

Occupancy type	TOTAL DWELLINGS	Total Unshared dwellings	Unshared dwellings				
			Unshared dwellings - purpose built				
						Purpose built Flat in:	
			Detached	Semi-detached	Terraced	Residential building	Commercial building
ALL TYPES OF OCCUPANCY	119773	119626	5814	34983	37495	37501	1076
Dwellings with residents	111216	111088	5624	34114	35256	32920	843
Dwellings with person(s) present	107151	107025	5462	33326	34342	31023	786
Dwellings with no person(s) present	4065	4063	162	788	914	1897	57
Vacant accommodation	6706	6701	177	764	1686	3590	183
New, never occupied	260	260	28	19	78	111	6
Under improvement	1024	1022	12	83	290	590	17
Other	5422	5419	137	662	1318	2889	160
Accommodation not used as main residence	1851	1837	13	105	553	991	50
No persons present	152	152	4	10	29	87	4
Second residences	124	124	4	10	20	74	2
Holiday accommodation	2	2	0	0	1	1	0
Student accommodation	26	26	0	0	8	12	2
Persons enumerated but no residents	1699	1685	9	95	524	904	46
Owner occupied	149	149	5	33	48	54	1
Not owner occupied	1550	1536	4	62	476	850	45

Table 4.14 Structure of Table LBS61: Dwelling type and occupancy: Dwellings; no permanent accommodation

1991 Census Local Base Statistics - 100% Area Identifier - Grid reference -

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Table L61 Dwelling type and occupancy: Dwellings; no permanent accommodation Part 2 of 2

Occupancy type	Unshared dwellings						
	Unshared dwellings converted		Unshared dwellings not self-contained				
	Converted flat	Converted flatlet	Not self-contained flat	Not self-contained 'rooms'	Bedsit	Shared dwellings	TOTAL NON PERMANENT ACCOMMOD-ATION
ALL TYPES OF OCCUPANCY	2504	243	8	0	2	147	19
Dwellings with residents	2109	213	8	0	1	128	15
Dwellings with person(s) present	1889	189	7	0	1	126	13
Dwellings with no person(s) present	220	24	1	0	0	2	2
Vacant accommodation	286	15	0	0	0	5	xxxx
New, never occupied	18	0	0	0	0	0	xxxx
Under improvement	29	1	0	0	0	2	xxxx
Other	239	14	0	0	0	3	0
Accommodation not used as main residence	109	15	0	0	1	14	4
No persons present	18	0	0	0	0	0	xxxx
Second residences	14	0	0	0	0	0	xxxx
Holiday accommodation	0	0	0	0	0	0	xxxx
Student accommodation	4	0	0	0	0	0	xxxx
Persons enumerated but no residents	91	15	0	0	1	14	4
Owner occupied	7	1	0	0	0	0	4
Not owner occupied	84	14	0	0	1	14	0

Table 4.15 Structure of Table LBS61 continued: Dwelling type and occupancy: Dwellings; no permanent accommodation

1991 Census Local Base Statistics - 100% Area Identifier - Grid reference -
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Table S61 Dwelling type and occupancy: Dwellings; no permanent accommodation Part 1 of 2

Occupancy type	TOTAL DWELLINGS	Total Unshared dwellings	Unshared dwellings - purpose built: Detached	Semi-detached	Terraced	Purpose built Flat in: Residential building	Purpose built Flat in: Commercial building
ALL TYPES OF OCCUPANCY	1	2	3	4	5	6	7
Dwellings with residents	15	16	17	18	19	20	21
Vacant accommodation	57	58	59	60	61	62	63
Accommodation not used as main residence	113	114	115	116	117	118	119
No persons present	127	128	129	130	131	132	133
Persons enumerated but no residents	183	184	185	186	187	188	189

Occupancy type	Unshared dwellings converted: Converted flat	Converted flatlet	Unshared dwellings not self-contained: Not self-contained flat	Not self-contained 'rooms'	Bedsit	Shared dwellings	TOTAL NON PERMANENT ACCOMMOD-ATION
ALL TYPES OF OCCUPANCY	8	9	10	11	12	13	14
Dwellings with residents	22	23	24	25	26	27	28
Vacant accommodation	64	65	66	67	68	69	xxxx
Accommodation not used as main residence	120	121	122	123	124	125	126
No persons present	134	135	136	137	138	139	xxxx
Persons enumerated but no residents	190	191	192	193	194	195	196

Table 4.16 Structure of Table SAS61: Dwelling type and occupancy: Dwellings; no permanent accommodation

Table LBS64 was investigated but failed to provide the number of local authority vacant household spaces (Tables 4.17 and 4.18). This table only provided the tenure of household spaces. Total vacant household spaces (6777) were those within dwellings, and not 'unattached household spaces'. This consisted of household spaces in occupied (54) and vacant accommodation (6723), which illustrated the Census hierarchical classification method. Vacant household spaces could be found in dwellings classified as occupied. Total vacant household spaces in vacant accommodation (6733) were categorised by tenure, but the majority (6723) were categorised under 'Vacant Accommodation', in effect as other. The remaining 10 household spaces were 'Rented privately – furnished' (9) or 'Rented from a housing association' (1). None of the vacant household spaces were identified as local authority rented.

Table LBS65 cross-tabulated the occupancy of dwellings with the occupancy of their constituent household spaces. This also provided further information about the 10 household spaces identified by table LBS64 as rented privately or from a housing association. These were found to be accommodation not used as main residence where persons were enumerated but there were no residents (Tables 4.19 and 4.20).

Tables LBS/SAS54 and LBS/SAS55 provided information about the occupancy of household spaces (Tables 4.21, 4.22 and 4.23). Table LBS/SAS54 provided the total number of vacant household spaces (6782) in dwellings (occupied and vacant). Table LBS/SAS55 confirmed that this figure included those in dwellings (6777), those classified as 'unattached household spaces' (5) and those in shared dwellings (76).

4.4.3 Census Data: 1991 occupied council housing stock

Table LBS/SAS62 provided occupied council stock figures (Table 4.24). These were dwellings (38665) occupied by residents (38570) or visitors (95 'dwellings with persons enumerated but no residents').

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Table L64 Tenure of dwellings and household spaces: Dwellings; household spaces in dwellings Part 1 of 2

Tenure or occupancy type of dwelling	TOTAL DWELLINGS	Unshared dwellings	Shared dwellings	TOTAL HOUSEHOLD SPACES	Tenure or occupancy type of household spaces: Owner occupied: Owned outright	Owner occupied: Buying	Rented privately: Furnished	Rented privately: Un-furnished
ALL TYPES OF OCCUPANCY	119773	119626	147	120246	18120	37706	6869	4600
Dwellings with residents	111216	111088	128	111631	18074	37603	5476	4581
Owner occupied - owned outright	18071	18062	9	18083	18074	1	5	2
- buying	37601	37585	16	37629	xxxx	37602	22	0
Rented privately - furnished	5161	5088	73	5403	xxxx	xxxx	5371	xxxx
- unfurnished	4577	4566	11	4632	xxxx	xxxx	40	4578
Rented with a job or business	1471	1471	0	1471	xxxx	xxxx	xxxx	xxxx
Rented from a housing association	5765	5751	14	5801	xxxx	xxxx	11	1
Rented from a local authority or new town	**38570**	**38565**	**5**	**38612**	**xxxx**	**xxxx**	**27**	**0**
Persons enumerated but no residents	1699	1685	14	1730	46	103	1384	19
Owner occupied	149	149	0	149	46	103	0	0
Not owner occupied	1550	1536	14	1581	xxxx	xxxx	1384	19
Vacant accommodation	**6706**	**6701**	**5**	**6733**	**0**	**0**	**9**	**0**
Other unocupied accommodation	152	152	0	152	xxxx	xxxx	0	0

Empty cells, that is, inapplicable categories of a variable, inapplicable combinations of categories of two or more variables that can have no counts or totals that are showen elsewhere in a table, are identfied by 'xxxx' (OPCS/GRO(S), 1991a)

Table 4.17 Structure of Table LBS64: Tenure of dwellings and household spaces: Dwellings; household spaces in dwellings

1991 Census Local Base Statistics - 100% Area Identifier - Grid reference -

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Table L64 Tenure of dwellings and household spaces: Dwellings; household spaces in dwellings Part 2 of 2

Tenure or occupancy type of dwelling	Tenure or occupancy type of household spaces						
					Accommodation not used as main residence - no persons present		
	Rented with a job or business	Rented from a housing assoc-iation	Rented from a local authority or new town	Vacant accommo-dation	Second residence	Holiday accommo-dation	Student accommo-dation
ALL TYPES OF OCCUPANCY	**1522**	**5816**	**11**	**6777**	**126**	**2**	**34**
Dwellings with residents	**1474**	**5782**	**26**	**54**	**2**	**0**	**6**
Owner occupied - owned outright	0	0	41	1	0	0	0
- buying	0	0	56	5	0	0	0
Rented privately - furnished	1	xxxx	xxxx	27	2	0	2
- unfurnished	1	xxxx	xxxx	13	0	0	0
Rented with a job or business	1471	xxxx	xxxx	0	0	0	0
Rented from a housing association	1	5782	116	2	0	0	1
Rented from a local authority or new town	**0**	**xxxx**	**38576**	**6**	**0**	**0**	**3**
Persons enumerated but no residents	48	33	95	xxxx	0	0	2
Owner occupied	0	0	0	xxxx	0	0	0
Not owner occupied	48	33	95	xxxx	xxxx	0	2
Vacant accommodation	**0**	**1**	**0**	**6723**	**0**	**0**	**0**
Other unocupied accommodation	0	0	0	xxxx	124	2	26

Table 4.18 Structure of Table LBS64 continued: Tenure of dwellings and household spaces: Dwellings; household spaces in dwellings

1991 Census Local Base Statistics - 100% Area Identifier - Grid reference -

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Table L65 Occupancy of dwellings and household spaces: Dwellings; household spaces in dwellings Part 1 of 2

Occupancy type of dwelling	TOTAL DWELLINGS	Unshared dwellings	Shared dwellings	Occupancy type of household spaces: TOTAL HOUSEHOLD SPACES	Households with residents: Persons present	Households with residents: Absent household	Vacant accommodation: New	Vacant accommodation: Under improvement	Vacant accommodation: Other	
ALL TYPES OF OCCUPANCY	119773	119626	147	120246	107396	4125	**260**	**1040**	**5477**	= **6777**
Dwellings with residents	111216	111088	128	111631	107396	4125	0	**6**	**48**	= **54**
Dwellings with person(s) present	107151	107025	126	107561	107396	55	0	6	48	
Dwellings with no person(s) present	4065	4063	2	4070	xxxx	4070	0	0	0	
Vacant accommodation	6706	6701	5	6733	xxxx	xxxx	**260**	**1034**	**5429**	= **6723**
New, never occupied	260	260	0	260	xxxx	xxxx	260	xxxx	xxxx	
Under improvement	1024	1022	2	1034	xxxx	xxxx	0	1034	0	
Other	5422	5419	3	5439	xxxx	xxxx	0	xxxx	5429	
Accommodation not used as main residence	1851	1837	14	1882	xxxx	xxxx	0	xxxx	xxxx	
No persons present	152	128	0	152	xxxx	xxxx	0	xxxx	xxxx	
Second residences	124	142	0	124	xxxx	xxxx	0	xxxx	xxxx	
Holiday accommodation	2	156	0	2	xxxx	xxxx	0	xxxx	xxxx	
Student accommodation	26	170	0	26	xxxx	xxxx	0	xxxx	xxxx	
Persons enumerated but no residents	1699	184	14	1730	xxxx	xxxx	0	xxxx	xxxx	
Owner occupied	149	198	0	149	xxxx	xxxx	0	xxxx	xxxx	
Not owner occupied	1550	212	14	1581	xxxx	xxxx	0	xxxx	xxxx	

Table 4.19 Structure of Table LBS65: Occupancy of dwellings and household spaces: Dwellings; household spaces in dwellings

1991 Census Local Base Statistics - 100%	Area Identifier -	Grid reference -
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Table L65 Occupancy of dwellings and household spaces: Dwellings; household spaces in dwellings

Occupancy type of dwelling	Occupancy type of household spaces				
	Accommodation not used as main residence				
	No persons present			Persons enumerated but no residents	
	Second residence	Holiday accommo-dation	Student accommo-dation	Owner occupied	Not owner occupied
ALL TYPES OF OCCUPANCY	126	2	34	149	1637
Dwellings with residents	2	0	6	0	48
Dwellings with person(s) present	2	0	6	0	48
Dwellings with no person(s) present	0	0	0	0	0
Vacant accommodation	**0**	**0**	**0**	**0**	**10**
New, never occupied	xxxx	xxxx	xxxx	xxxx	xxxx
Under improvement	0	0	0	0	0
Other	0	0	0	0	10
Accommodation not used as main residence	124	2	28	149	1579
No persons present	124	2	26	xxxx	0
Second residences	124	0	0	xxxx	0
Holiday accommodation	xxxx	2	0	xxxx	xxxx
Student accommodation	xxxx	xxxx	26	xxxx	xxxx
Persons enumerated but no residents	0	0	2	149	1579
Owner occupied	0	0	0	149	0
Not owner occupied	xxxx	0	2	xxxx	1579

Table 4.20 Structure of Table LBS65 -continued : Occupancy of dwellings and household spaces: Dwellings; household spaces in dwellings

1991 Census Local Base Statistics - 100% Area Identifier - Grid reference -

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Table L54 Occupancy (occupied, vacant and other accommodation): Household spaces; rooms in household spaces; rooms in hotels and boarding houses

Occupancy type	TOTAL HOUSEHOLD SPACES	TOTAL ROOMS
ALL TYPES OF OCCUPANCY	120339	566635
Households with residents	111597	529021
Enumerated with person(s) present	107462	511393
Absent households (enumerated)	1683	7598
Absent households (imputed)	2452	10030
Vacant accommodation	**6782**	**27784**
New, never occupied	260	1242
Under improvement	1041	4520
Other	5481	22022
Accommodation not used as main residence	1960	9830
No persons present	162	610
Second residences	126	473
Holiday accommodation	2	9
Student accommodation	34	128
Persons enumerated but no residents	1798	9220
Owner occupied	154	715
Not owner occupied	1644	8505
Hotels and boarding houses	xxxx	2641

Table 4.21 Structure of Table LBS/SAS54: Occupancy (occupied, vacant and other accommodation): Household spaces; rooms in household spaces; rooms in hotels and boarding houses

1991 Census Local Base Statistics - 100% Area Identifier - Grid reference -

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Table L55 Household spaces and occupancy: Household spaces in permanent buildings; dwellings

Occupancy type	TOTAL HOUSEHOLD SPACE	Household spaces in dwellings with the following number of household spaces			Unattached household spaces (not in a dwelling)
		1	2	3 or more	
ALL TYPES OF OCCUPANCY	120320	119626	100	520	74
Households with residents	111582	111088	83	350	61
Enumerated with person(s) present	107449	107025	81	290	53
Absent housholds (enumerated)	1683	1662	1	16	4
Absent households (imputed)	2450	2401	1	44	4
Vacant accommodation	**6782**	**6701**	**2**	**74**	**5**
New, never occupied	260	260	0	0	0
Under improvement	1041	1022	0	18	1
Other	5481	5419	2	56	4
Accommodation not used as main residence	1956	1837	15	96	8
No persons present	162	152	1	9	0
Second residences	126	124	0	2	0
Holiday accommodation	2	2	0	0	0
Student accommodation	34	26	1	7	0
Persons enumerated but no residents	1794	1685	14	87	8
owner occupied	150	149	0	0	1
Not owner occupied	1644	1536	14	87	7
TOTAL DWELLINGS	119773	119626	50	97	xxxx

Table 4.22 Structure of Table LBS55: Household spaces and occupancy: Household spaces in permanent buildings; dwellings

1991 Census Local Base Statistics - 100%	Area Identifier -			Grid reference -	
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Table S55 Household spaces and occupancy: Household spaces in permanent buildings; dwellings					
Occupancy type	TOTAL HOUSEHOLD SPACE	Household spaces in dwellings with the following number of household spaces			Unattached household spaces (not in a dwelling)
		1	2	3 or more	
ALL TYPES OF OCCUPANCY	1	2	3	4	5
Households with residents	6	7	8	9	10
Enumerated with person(s) present	11	12	13	14	15
Absent housholds (enumerated)	16	17	18	19	20
Absent households (imputed)	21	22	23	24	25
Vacant accommodation	26	27	28	29	30
Accommodation not used as main residence	46	47	48	49	50
No persons present	51	52	53	54	55
Persons enumerated but no residents	71	72	73	74	75
TOTAL DWELLINGS	86	87	88	89	xxxx

Table 4.23 Structure of Table SAS55: Household spaces and occupancy: Household spaces in permanent buildings; dwellings

1991 Census Local Base Statistics - 100% Area Identifier - Grid reference -

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Table L62 Occupancy and tenure of dwellings: Dwellings with persons present or resident

Occupancy type	TOTAL DWELLINGS	Owner occupied		Rented privately		Rented with a job or business	Rented from a housing assoc-iation	Rented from a local authority or new town
		Owned outright	Buying	Furnished	Un-Furnished			
ALL TYPES OF OCCUPANCY	**112915**	**18117**	**37704**	**6516**	**4596**	**1519**	**5798**	**38665**
Dwellings with residents	**111216**	**18071**	**37601**	**5161**	**4577**	**1471**	**5765**	**38570**
Dwellings with persons(s) present	107151	17313	36414	4812	4362	1371	5425	37454
Dwellings with no persons(s) present	4065	758	1187	349	215	100	340	1116
Dwellings with persons enumerated but **no residents**	**1699**	**46**	**103**	**1335**	**19**	**48**	**33**	**95**

Table 4.24 Structure of Table LBS/SAS62: Occupancy and tenure of dwellings: Dwellings with persons present or resident

4.4.4 Census Data: Residential dwellings

Although three tables provided residential dwelling figures (LBS/SAS55, LBS/SAS61, LBS65), only those in table LBS/SAS61 were selected because this provided dwelling figures (119773) for both Wards and EDs. The total figure consisted of occupied (111216), vacant (6706) and accommodation not used as main residence (1851).

4.5 Chapter Summary

This chapter interpreted the datasets, highlighted the benefits of local authority data and the combination of this with Census data and illustated the barriers in the integration process. These were noted as areas requiring further research in the reviewed literature (Chapter 2 – Section 2.2). The review highlighted the assessment of the usefulness of local authority data 'as a check on the census' (Simpson, 1993) and the neglect of creating value-added datasets in local authorities (Worrall, 1992). This chapter identified comparable variables and constructed figures for occupied council stock, vacant dwellings and total dwellings. The interpretation process noted the difficulties with both the Census and local authority data. There were several varied figures available for vacant council stock, occupied council stock and total council stock in 1991 from the local authority. There were also difficulties with constructing Census figures for basic variables, which were found to be dispersed among several tables. Total council stock figures for example, could not be obtained because of the absence of vacant council stock figures. The differences were noted as potential sources of error and possible reasons for the differences in total vacancy figures, occupied council stock and total dwelling figures detailed in Chapters 5 and 6. Data interpretation process confirmed that the value of local authority datasets can be enhanced when combined with information from other local authority data sources. The implications of the findings in this chapter are discussed more fully in Chapter 7 (Section 7.3).

In 1991, the total **council stock** in the City, according to the datasets (41550), was slightly (-2%) less than the figure in the 1991 Housing Annual report (42210). The proportion of **occupied council stock** according to the datasets (39374) was also slightly (2%) less than the figure in the housing report (40324). This was comparable with the Census figure of 38665 from LBS/SAS62. By contrast, **vacant council stock**

as recorded by the datasets (2176) was 15% (290) more than the 1990/91 Housing Annual report (1886). Although a comparable figure of vacant council stock was not available from the Census, the total number of vacancies from LBS/SAS61 (6858) was comparable to that from the 1991 vacant properties database (9116). The figure of total residential dwellings, obtained from the property gazetteer (120210) and that from the TWRI (119723) were similar (Table 4.25).

Variable	Datasets (A)	1991 Housing Annual Report (B)	Computer printouts	Difference: A-B	1991 Census
Residential dwellings	120210	119723 (TWRI)		492 (0.4%)	
Council housing stock	**41550**	**42210**		**-660 (-2%)**	
Occupied council housing stock	**39374**	**40324**		**-950 (-2%)**	**38665**
Vacant residential dwellings	9116				6872
Vacant council housing stock	**2176**	**1886**	**2165**	**290 (13%)**	

Table 4.25 District figures: Comparison of all variables

Comparison of the local authority figures, highlighted Benwell and Blakelaw Housing Areas (Table 4.26). In Benwell, the dataset vacancy figure was lower than that in the 1991 Housing Annual report. This was the opposite to the city-wide pattern. In addition, the total council stock figure was similar to that published in the report. Blakelaw was highlighted because of the unusually high dataset council stock figure, in comparison with that in the housing report.

	Council housing stock		Occupied council housing stock		Vacant council housing stock	
Area	Data - HA	Difference as % of dataset figure	Data - HA	Difference as % of dataset figure	Data - HA	Difference as % of dataset figure
Blakelaw	**126**	**1.39%**	**-44**	**-0.51%**	**170**	**35%**
Benwell	**-7**	**-0.14%**	**194**	**4.24%**	**-201**	**-43%**
Walker	-115	-1.44%	-194	-2.51%	79	34%
Cruddas Park	-161	-3.88%	-191	-5.27%	30	6%
Newburn/ Westerhope	-224	-2.96%	-352	-4.84%	128	42%
G/B/H/S	-303	-3.92%	-387	-5.12%	84	51%
City-wide totals*	-684	-1.65%	-974	-2.48%	290	13%

Table 4.26 Housing Areas: Comparison of all variables

Within Benwell, where the council stock figures were found to be similar, South Benwell and Elswick Neighbourhoods had the largest differences. In South Benwell, the dataset figures of total council stock, vacant and occupied council stock were lower than the provided figures in the 1991 Housing Annual report (Table 4.27). Low dataset

vacancy figures were also found in Scotswood. In Elswick however, the opposite pattern was observed. Dataset figures for both the total council stock and those occupied were higher than those in the housing report. The pattern of higher dataset council stock figure in Blakelaw, was repeated in Fawdon Neighbourhood, where the dataset figures for all three variables were higher than those in the housing report. In contrast, the dataset figures in Fenham were lower than those in the housing report. Cruddas Park was another Neighbourhood where significant differences (-6%) in total and occupied council stock figures were noted. The highlighted Neighbourhoods contained large numbers of student accommodation, properties awaiting demolition, tower blocks and businesses. It was also noted that the dataset vacancy figure for the city (2176) closely matched the figure derived from the computer printouts (2165). This raised doubts about the relatively low local authority vacancy figure (1886) quoted in the 1991 Housing Annual report.

		1991 council housing stock		1991 Occupied council housing stock		Local authority vacant residential dwellings	
Area	Neighbourhood	Data - HA	Difference as % of dataset figures	Data-HA	Difference as % of dataset figures	Data - HA	Difference as % of dataset figures
Benwell	**Elswick**	**180**	**25.4%**	**184**	**29.9%**	-4	-4.3%
	North Benwell	-36	-3.0%	-47	-4.1%	11	29.7%
	Scotswood	62	2.6%	168	7.7%	-106	-42.2%
	South Benwell	**-213**	**-29.3%**	**-111**	**-17.3%**	**-102**	**-120.0%**
Blakelaw	Blakelaw	118	3.8%	98	3.2%	20	31.7%
	Cowgate	94	5.1%	-46	-2.9%	140	53.4%
	Fawdon	**128**	**9.8%**	**103**	**8.1%**	**25**	**69.4%**
	Fenham	**-326**	**-25.8%**	**-330**	**-26.6%**	4	19.0%
	North Kenton	112	7.2%	131	9.0%	-19	-18.3%
Cruddas Park	Avison Street	-13	-0.8%	10	0.6%	-23	-31.9%
	Cruddas Park	-148	-6.0%	-201	-9.9%	53	11.9%
G/B/H/S	Byker	-102	-3.7%	-120	-4.4%	18	39.1%
	Gosforth	-86	-5.1%	-103	-6.2%	17	47.2%
	Heaton	-66	-5.4%	-78	-6.5%	**12**	**66.7%**
	Shieldfield	-49	-2.4%	-86	-4.4%	37	56.1%
Newburn/ Westerhope	Newbiggin Hall	-118	-5.0%	-206	-9.5%	88	47.8%
	Newburn	81	2.9%	67	2.5%	14	23.7%
	West Denton	-187	-7.7%	-213	-9.0%	26	43.3%
Walker	Daisy Hill	-33	-3.2%	-39	-3.8%	6	31.6%
	Pottery Bank	-42	-2.8%	-62	-4.6%	20	15.3%
	St Anthony's North	-45	-2.4%	-58	-3.1%	13	52.0%
	St Anthony's South	-43	-2.1%	-64	-3.2%	21	61.8%
	Walker	48	3.2%	29	1.9%	19	70.4%
City-wide totals		-684	-1.7%	-974	-2.5%	290	13.3%

Table 4.27 Housing Neighbourhoods: Comparison of all variables: Dataset figures - the figures from the 1990/91 Housing Annual (HA) report

Chapter 5 Spatial distribution of differences between the 1991 Census and local authority data

Chapter Overview

The previous chapter identified variables and constructed comparable figures from the Census and local authority sources. This chapter investigates the distribution of differences in figures for each variable. Section 5.1 is an overall description. The next five sections present the results at the City scale, and at increasing resolution: Housing Area, Housing Neighbourhood, Ward and ED (Sections 5.2 to 5.7). This local scale investigation continues by comparing the characteristics of areas with significant differences in vacant, occupied and total dwelling figures with those of areas reported as difficult to enumerate, in the national studies of Census underenumeration (Section 5.8). The reasons for the observed differences are detailed in Chapter 6 and the implications of the findings, regarding housing need estimates and Census research, are discussed in Chapter 7 (Section 7.4).

5.1 Introduction

The comparison of Census and local authority data sources, listed in the previous chapter, identified the following comparable variables:

- occupied council housing stock
- vacant residential dwellings (all tenures)
- all residential dwellings (total, both occupied and vacant)

The figures for council housing stock (total, both occupied and vacant) were not available from the Census and could only be obtained from local authority sources. In this chapter, the distribution of differences between two sets of figures for each of the variables are described and the areas with greatest differences are noted (Table 5.1). The characteristics of these areas were compared with those of areas with EwC non-response adjustment figures. This was carried out through correlating the differences and the adjustment figures with area characteristics such as dwelling structure and tenure. This was also carried out in order to test some of the national hypotheses about Census underenumeration, at the local scale.

The analysis of differences was carried out at City scale and at four resolutions (Housing Area, Housing Neighbourhood, Ward and ED) and the correlation analysis was carried out at two scales with the same resolution (EDs in the City and EDs in Benwell and Scotswood only). EDs in Benwell and Scotswood were considered as a sample of the total number of EDs in the City. The actual reasons for the observed differences were then sought, using the individual property records. The analysis of differences at Housing area and Housing Neighbourhood resolutions, allowed for the incorporation of information from the local authority sources. Analysis at Ward and ED resolutions, allowed the combination of data from the Census, local authority and the EwC project. Arcview polygon shapefiles of Housing Area, Housing Neighbourhood, Ward and ED boundaries were used to maintain figures for the selected variables at each resolution (Appendix 5). These values were obtained by first converting the local authority databases into point shapefiles, and then counting the number of records within areas at each resolution. Arcview's point-in-polygon procedure was used for this aggregation. The final figures were added to the attribute tables of the polygon shapefiles, used for each resolution.

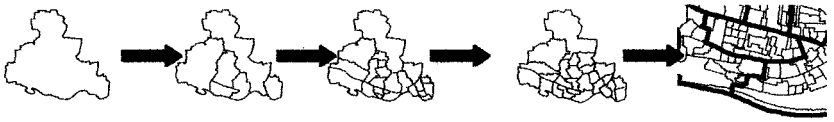
	City Scale		**Increasing resolution**		
					
	District	**Area**	**Neighbourhood**	**Ward**	**ED**
Section No.	5.2	5.3	5.4	5.5	5.6
Variables					
Occupied council housing stock	5.2.2	5.3.1	5.4.1	5.5.1	5.6.1
Vacant residential dwellings	5.2.3	5.3.2	5.4.2	5.5.2	5.6.2
All residential dwellings	5.2.4	5.3.3	5.4.3	5.5.3	5.6.3
Summary	5.2.5	5.3.4	5.4.4	5.5.4	5.6.4
Overall Summary			5.7		

Table 5.1 Structure of Chapter 5: Spatial Patterns of differences between the Census and the local authority figures

Census District figures were readily available. Census figures for Housing Areas and Housing Neighbourhoods were obtained by aggregating Census ED figures for each of these areas. Marginal EDs were allocated to Housing Areas and Housing Neighbourhoods, by visual inspection of the location of point data within the ED. If the majority of the points fell within a particular Housing Area or Housing Neighbourhood,

then the EDs within which they were located was assigned to the associated Housing Area or Neighbourhood. Census LBS and SAS figures were added to the attribute tables of Ward and ED shapefiles respectively. Transferring the information from databases into shapefiles' attribute tables, allowed them to be used in calculating new attributes and building profiles at each resolution. For example, the counts of 1995 council housing stock, demolished properties, sheltered accommodation and vacant properties were separate attributes in each polygon shapefile. The 1991 council housing stock was then calculated from these counts. The profiles, included both the actual and the expected average difference between Census and local authority data. The actual difference was calculated from the raw Census and local authority counts. The expected average difference was calculated for each variable and at each resolution. The city-wide actual difference, was spread among areas, pro-rata to the proportion of the city-wide total of each variable in each area. For example, the expected average difference between occupied council stock counts per Ward was calculated by multiplying the overall city-wide actual difference in occupied council stock by the proportion of council stock in each Ward. The differences between the actual and the expected average difference at each resolution were then mapped, highlighting areas with differences that were noticeably above or below the city average. The analysis focused on finding evidence of:

- Missed whole buildings, which were made apparent through the comparison of total dwelling counts from both sources.

- Misclassified buildings, where the enumerators allocated buildings to the wrong occupancy type (i.e. occupied enumerated as vacant and vice versa)

Correlation analysis was carried out (using Minitab) between the differences in vacancy counts, occupied local authority dwellings, total residential dwellings and other selected variables, which described area characteristics. These related to dwelling structure, tenure, number of imputed residents, number of accommodation not used as main residence and EwC non-response adjustments. The observed patterns were then explained, using the individual property records.

5.2 District Scale

5.2.1 District Scale: Occupied council housing stock

The number of Census occupied council stock (38648) was only 195 (0.5%) properties more than the local authority figure (38453). The local authority figure was obtained by subtracting the number of local authority vacancies (2176) and sheltered accommodations (921) from the total council stock figure (41550). This total consisted of records from the council properties (39158) and old properties (2392) databases (Table 5.2).

Occupied council housing stock (38453)
=
Number of council properties in 1995 (39158)
+
Ex-council properties (2392)
(Demolished/Disposed after Census night)
-
sheltered accommodation (921)
-
vacant council stock (2176)

Table 5.2 Methods of calculating occupied council stock from the local authority datasets, for comparison with Census figures

5.2.2 District Scale: vacant residential dwellings (all tenures)

The 1991 Census Local Base Statistics (LBS61), reported a figure of 6705[9] for the total number of *vacant accommodation*, on Census night. In addition to these, the Census reported 157 vacant accommodations that were not used as main residence. A total figure of 6862 vacant accommodations, was compared to 9116 vacant *addresses* as recorded by the 1991 vacant properties database, 33% (2254) more than the Census figures. The majority of this difference was due to different data collection methods and definitions. The total number of vacancies according to the Community Charge records referred to addresses, which under the Census definitions, were not all considered as vacant dwellings. The datasets validity check outlined in Chapter 4 confirmed that the 1991 vacant properties database provided a reliable source of information. The figure of local authority vacancies (2176) obtained from this database was similar to that obtained from the Housing Department's internal computer printouts (2165) but not the 1991 Housing Annual report (1886).

[9] City-wide totals for Newcastle were quoted as 6706 in Chapter 4 from tables obtained from Chief Exec's section of Newcastle City Council. The slight differences (+/-5) between these and LBS61 data obtained from MIDAS were ignored.

5.2.3 District Scale: all residential dwellings (occupied and vacant)

The Census figure from table LBS61 (119767) was 0.4% (448) less than the 1995 Gazetteer (120215). The reasons for this difference and possible evidence of Census underenumeration of dwellings was sought at sub-district resolutions.

5.2.4 District Scale: Summary

The Census District figure of all residential dwellings (119767) was close to the local authority figure (120215). The reasons for the difference could not however be entirely explained in terms of Census over/underestimation, as other factors such as data collection methods and definitions were also responsible (Table 5.3). A number of possibilities for the observed differences were suggested in Chapter 2:

- Missed or misclassified vacancies by the Census
- Vacancies in multi-occupied buildings classified as communal establishments, under the Census terms. These were excluded in the Census figures of residential vacancies while the datasets recorded individual vacant addresses within the buildings. This resulted in higher dataset figures and a Census shortfall of vacancies.

The Census excess of occupied local authority dwellings was explained considering that:

- Some of the difference could be due to Census misclassification of vacant as occupied dwellings
- Various assumptions used in the construction of dataset figures, may have resulted in producing a low dataset figure of occupied council stock (such as the proportion of ex-council properties which were added to the 1995 council stock figure)

The specific reasons and explanations for the Census shortfall of occupied and excess of vacant dwellings were investigated more fully at Housing Area, Housing Neighbourhood, Ward and ED resolutions.

	Census	Local authority data	Difference Census – LA Data	In comparison with the dataset figures, the Census:
1991 occupied council housing stock	38648	38453	+195 (0.5%)	Over-counted slightly
Vacant residential dwellings	6862	9116	-2254 (33%)	Undercounted largely due to definitional differences
All residential dwellings	119767	120215	-448 (0.4%)	Undercounted slightly
	119723 (TWRIU)	120215	-492 (0.4%)	Closely matched the TWRIU figures
1991 council housing stock	Not Available	40629		

Table 5.3 District: Summary

5.3 Housing Areas

5.3.1 Housing Areas: Occupied council housing stock

The 0.5% (195) city-wide Census excess of occupied council stock compared with local authority datasets was distributed between three Housing Areas; G/B/H/S (4.7%), Newburn/Westerhope (3%) and Cruddas Park (2.6%). The opposite pattern was observed in Blakelaw (-2.9%), Benwell (-3.1%) and Walker (-0.9%), where shortfalls of Census figures were found (Figure 5.1 and Table 5.4).

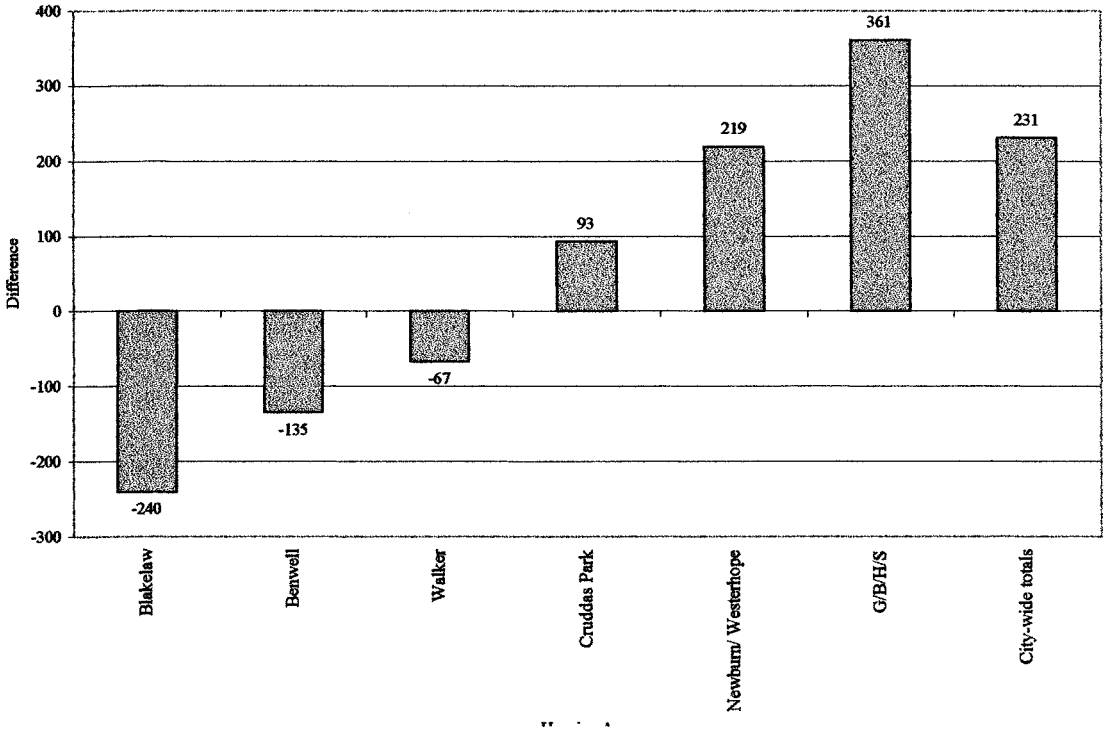


Figure 5.1 Housing Areas: Actual differences in raw counts of occupied council housing stock - 1991 Census – Local authority dataset figure

		Sheltered Accom. excluded			Sheltered Accom. included					
Area	LA data: Sheltered Accom	1991 Census: (SAS62)	Datasets: Occupied council stock	Difference 1: Census – Data	HA report: Occ. council stock	dataset: Occ. councilstock	Difference 2: HA - Data	Difference 1 as % of Census figures	Expected average diff.	Actual – Exp. diff.
Blakelaw	97	8254	8494	-240	8635	8591	44	-2.9%	49	-289
Benwell	31	4406	4541	-135	4378	4572	-194	-3.1%	26	-161
Walker	212	7454	7521	-67	7927	7733	194	-0.9%	45	-112
Cruddas Park	119	3600	3507	93	3817	3626	191	2.6%	22	71
Newburn/ Westerhope	166	7322	7103	219	7621	7269	352	3.0%	44	175
G/B/H/S	296	7624	7263	361	7946	7559	387	4.7%	46	315
City totals[10]	921	38660*	38429*	231	40324	39350	974	0.6%	232	-1

Table 5.4 Housing Areas: Differences between occupied council stock figures from the Census, the datasets and the 1990/91 Housing Annual Report

The investigation focused on Benwell, Blakelaw, Walker and Cruddas Park because the the dataset figures in G/B/H/S and Newburn/Westerhope were found to be too low in comparison with both the Census and the Housing Annual report figures (in Chapter 4). The reasons for the Census excess or shortfall of occupied council properties varied in each area. The observed area differences were explained considering the comparison of dataset and housing report figures in each area (outlined in Chapter 4). In Benwell the dataset figure of occupied council stock was too high, because of the significantly low council vacancy figure derived from the datasets. Hence, there was a 3.1% Census shortfall of occupied council stock in this area. The reason for the high number of occupied and low number of local authority vacancy figures in this area was investigated using the individual property records (Chapter 6). This was found to be the absence of demolished or disposed property records in the 1991 vacant properties database.

In Blakelaw the dataset figure agreed with (only 0.5% higher) the Housing Annual report figure, suggesting that the Census could have missed or misclassified 2.9% of occupied council properties in comparison with the datasets (Figure 5.2). In Walker, the dataset figure was found to be too low compared to the Housing Annual report figure. The Census recorded a slightly lower (0.9%) figure than the dataset, suggesting that this pattern could also be due to Census underestimation of occupied council stock. Evidence of Census underestimation of occupied council stock was therefore sought in

[10] This (38660) was the aggregated Census figure from table SAS62, which was slightly higher than the District figure (38648) from table LBS62. The dataset figure (38429) excluded 24 addresses that could not be georeferenced. Hence the District total figure of occupied local authority addresses (38453) was reduced to 38429.

Blakelaw and Walker. Benwell area was investigated to find the reasons for the missing vacant properties in the 1991 vacant properties database.

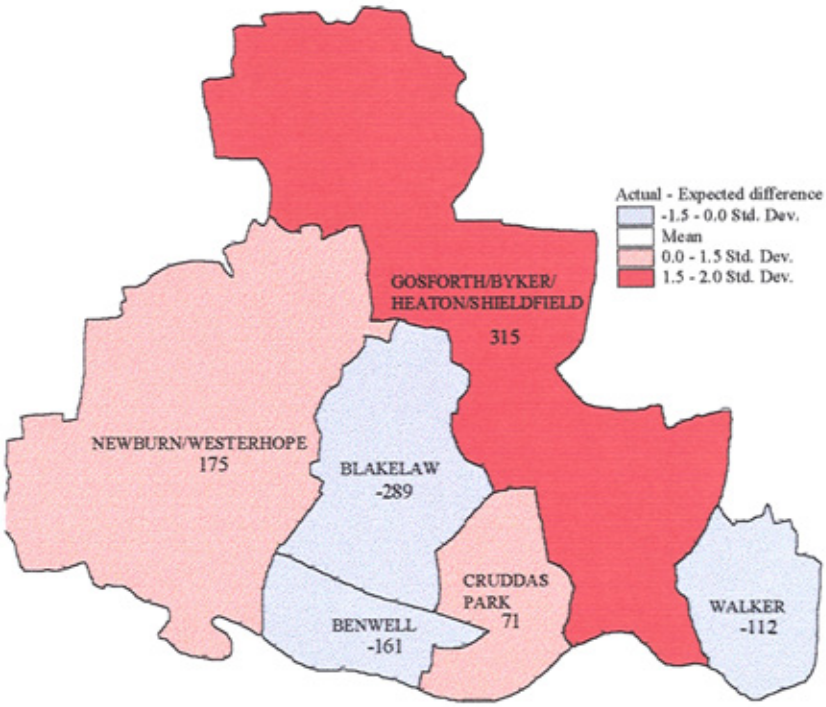


Figure 5.2 Housing Areas: Spatial distribution of differences in occupied council housing stock: Actual difference– Expected Average difference

In Cruddas Park, Newburn/Westerhope and G/B/H/S the Census figures were higher than the dataset figures. Census overestimation of occupied council stock was only investigated in Cruddas Park, as the observed pattern in the other two Housing Areas was due to low dataset figures (as outlined in Chapter 4).

5.3.2 Housing Areas: vacant residential dwellings (all tenures)

The 33% (2254) shortfall of Census vacancies in the City was distributed between all Housing Areas, except Benwell and Walker (Figure 5.3). Census count of vacancies was 12.8% higher in Benwell because of the low dataset vacancy figure. Vacancy figures in Walker from both sources matched, but they were found to be higher than the figure reported in the 1991 Housing Annual Report

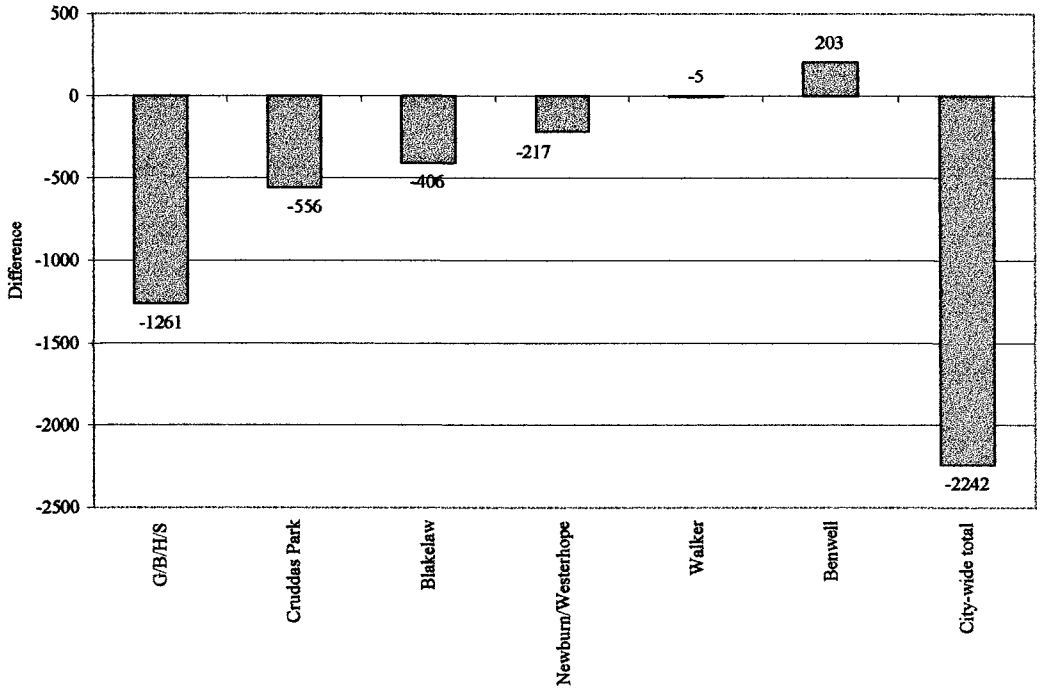


Figure 5.3 Housing Areas: Actual differences in raw counts of vacant residential dwellings: 1991 Census – Local authority dataset figure

As outlined in Chapter 4, the dataset figure of vacant council properties in Benwell (466), was significantly lower than the figures from the 1991 Housing Annual report (667) and the Housing Department's internal computer records (695). This was partly because demolished or disposed properties were not included in the datasets. The total number of vacancies according to the datasets were lower than expected when compared to the Census figure (Table 5.5 and Figure 5.4). This was the reason for the observed overestimation of vacancies by the Census in this area.

Housing Area	1991 Vacant properties database	SAS61: Vacant Accom	Accom not used as main residence – no persons present	Total Census Vacant Accom	Census – Datasets	% of Census figures	Expected average difference	Actual – Expected difference
G/B/H/S	3211	1879	71	1950	-1261	-64.7%	-636	-625
Cruddas Park	1679	1098	25	1123	-556	-49.5%	-366	-190
Blakelaw	1403	981	16	997	-406	-40.7%	-325	-81
Newburn/ Westerhope	812	587	8	595	-217	-36.5%	-194	-23
Walker	631	595	31	626	-5	-0.8%	-204	199
Benwell	1380	1579	4	1583	203	-12.8%	-516	719
City totals[11]	9116	6719*	155*	6874	-2242	-32.6%	-2241	-1

Table 5.5 Housing Areas: Differences between residential vacant dwelling figures from the Census and the datasets

[11] Figures of Census vacant accommodation (6719) and accommodation not used as main residence – no persons present (155), were aggregated SAS61 ED figures which provided the Census total figure of vacant accommodation (6874).

Blakelaw, Cruddas Park, Newburn/Westerhope and G/B/H/S were the Housing Areas with Census shortfalls of vacancies. Using the dataset validation results in Chapter 4, it was found that this pattern in Newburn/Westerhope and G/B/H/S was the result of high dataset vacancy figures. In Blakelaw and Cruddas Park however, the dataset vacancy figures agreed with other local authority sources (Chapter 4). These Housing Areas were therefore further investigated to find evidence of Census underestimation of vacancies. Benwell was investigated to find the reasons for the excess of Census vacancies.

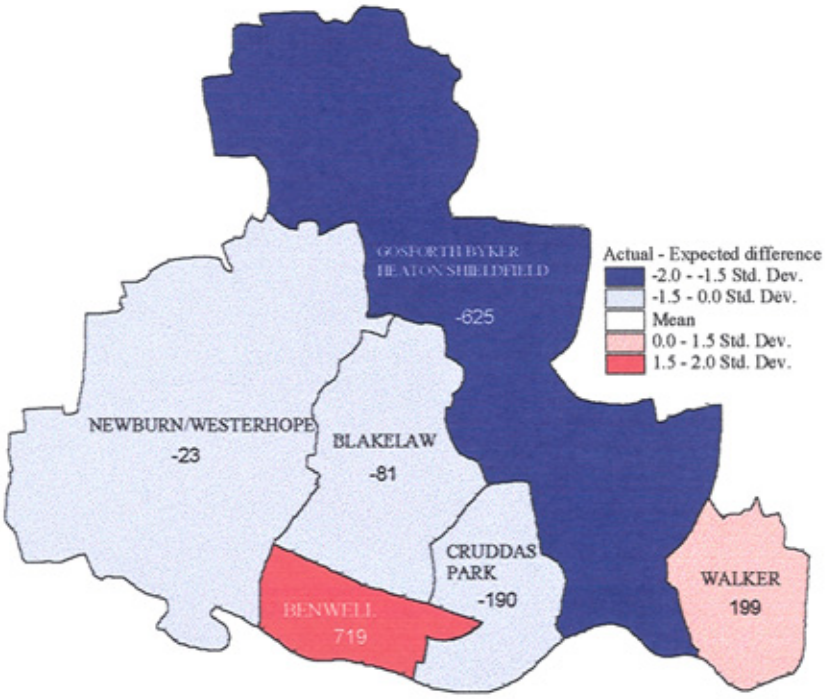


Figure 5.4 Housing Areas: Spatial distribution of differences in vacant residential dwellings: Actual – Expected Average

5.3.3 Housing Areas: all residential dwellings (occupied and vacant)

The 0.4% District shortfall of Census residential dwelling figure, compared to that from the 1995 Gazetteer, was distributed mainly between Benwell (1.79%) and Blakelaw (2.89%). In Cruddas Park (2.07%) and G/B/H/S (0.88%) however, Census excess of residential dwellings were found (Figure 5.5). The figures of total number of residential dwellings closely matched in Walker and Newburn/Westerhope. The analysis at the ED resolution (Chapter 6), provides a detailed breakdown of residential dwellings by tenure and structure.

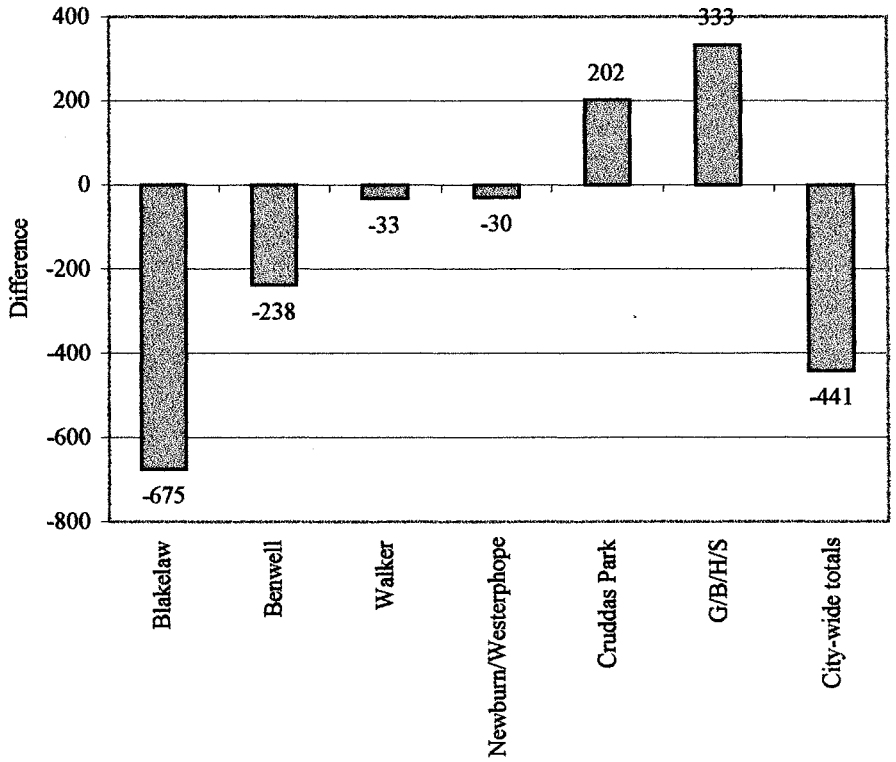


Figure 5.5 Housing Areas: Actual differences in raw counts of residential dwellings: 1991 Census – Local authority dataset figure

Comparing the Census figure with those from the 1995 Gazetteer (Chapter 4), confirmed that the Census figures were closer to the TWRIU figures than those from the Gazetteer. The Census figure of residential dwellings therefore, was found to be more reliable than the dataset figure (Table 5.6 and Figure 5.6).

Housing Area	Census total residential dwellings(SAS61)	1995 Gazetteer Total residential addresses	Actual difference	% actual difference	Expected average difference	Difference between actual - expected
Blakelaw	23349	24024	-675	-2.89%	-85.97	-589
Benwell	13282	13520	-238	-1.79%	-48.90	-189
Walker	13642	13675	-33	-0.24%	-50.23	17
Newburn/ Westerhope	21732	21762	-30	-0.14%	-80.02	50
Cruddas Park	9740	9538	202	2.07%	-35.86	238
G/B/H/S	38029	37696	333	0.88%	-140.00	473
City-wide totals	119774	120215	-441	-0.37%	-441	0

Table 5.6 Housing Areas: Differences between residential dwelling figures from the Census and the datasets

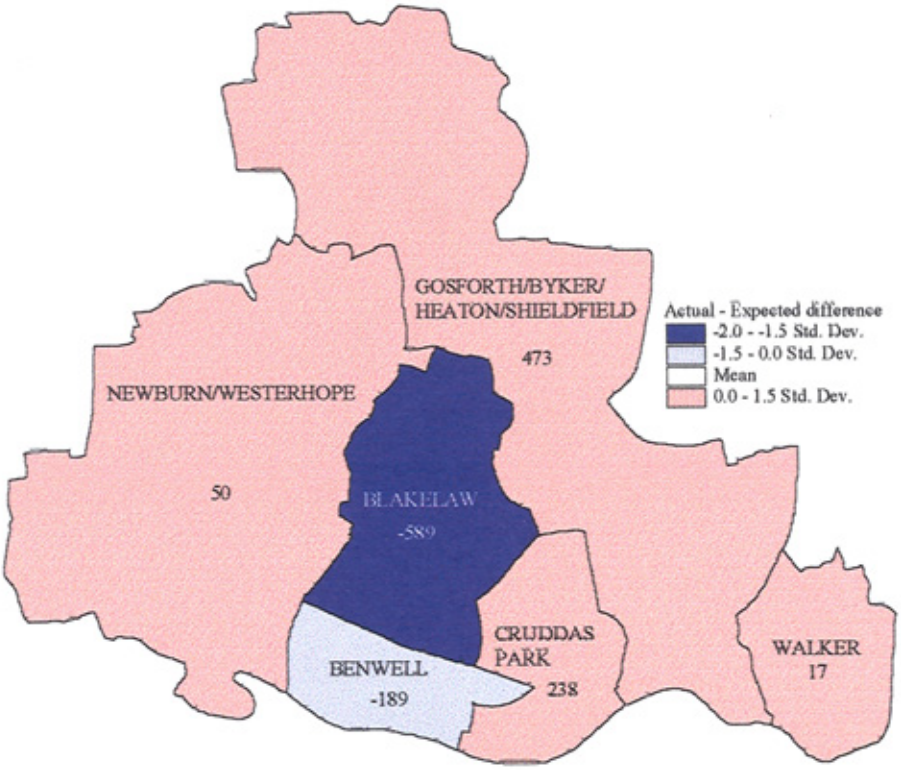


Figure 5.6 Housing Areas: Spatial distribution of differences in residential dwelling figures: Actual – Expected Average

5.3.4 Housing Areas: Summary

The city-wide pattern of Census shortfall of total residential dwellings and vacant dwellings and the Census excess occupied council stock was not reproduced in any of the Housing Areas. Variations of this pattern were observed. The Housing Areas where it was found that the differences were more likely to be due to Census errors were identified. The investigation at the Housing Neighbourhood resolution focused on explaining differences in Benwell, Blakelaw, Walker and Cruddas Park (Figure 5.7). In Benwell, Census shortfall of occupied council stock and excess of vacancies and all residential dwellings were found. The pattern in Walker was the same, but the Census total residential dwelling counts closely matched the dataset figure. In Blakelaw Census shortfall of all three variables were found (Table 5.7).

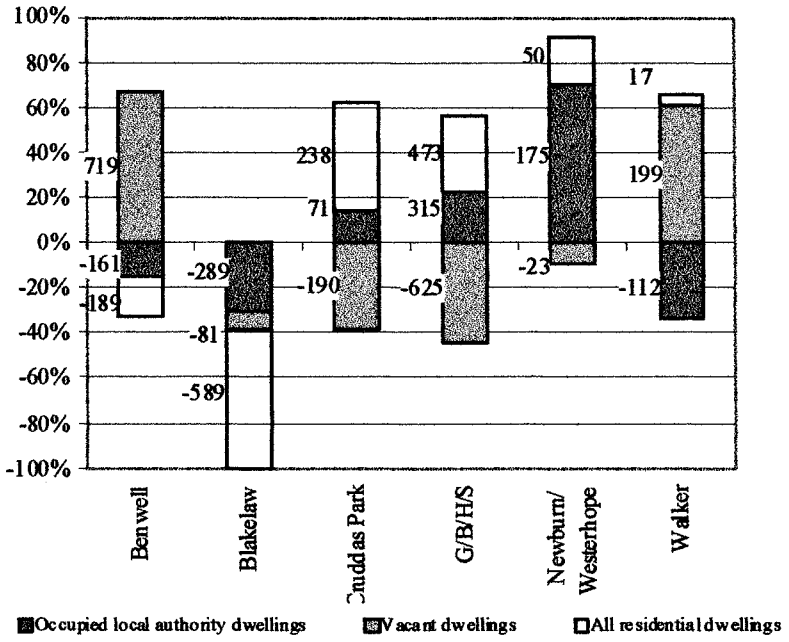


Figure 5.7 Actual minus expected average difference between raw counts of Census and local authority data

Area			Occupied council stock		Residential vacancies		All residential dwellings	
	Census No of Communal Est.	LA data: No of addresses in Sheltered Accom	Actual difference	Actual minus expected average difference	Actual difference	Actual minus expected average difference	Actual difference	Actual minus expected average difference
Benwell	24	31	-135	-161	203	719	-238	-189
Blakelaw	15	97	-240	-289	-406	-81	-675	-589
Cruddas Park	37	119	93	71	-556	-190	202	238
G/B/H/S	88	296	361	315	-1261	-625	333	473
Newburn/ Westerhope	17	166	219	175	-217	-23	-30	50
Walker	10	212	-67	-112	-5	199	-33	17
City totals	191	921	231	-1	-2242	-1	-441	0

Table 5.7 Actual minus expected average differences in counts of occupied council stock, all vacancies and the total residential dwellings

5.4 Housing Neighbourhoods

5.4.1 Housing Neighbourhoods: Occupied council housing stock

The analysis focused on the Neighbourhoods within Benwell, Blakelaw, Walker and Cruddas Park. Census shortfall of occupied council stock in Benwell, Blakelaw and Walker also appeared in most of the constituent Neighbourhoods (Figure 5.8). Pottery Bank (28%), Fawdon (19%) and South Benwell (14%) were among the Neighbourhoods with the most differences (Table 5.8).

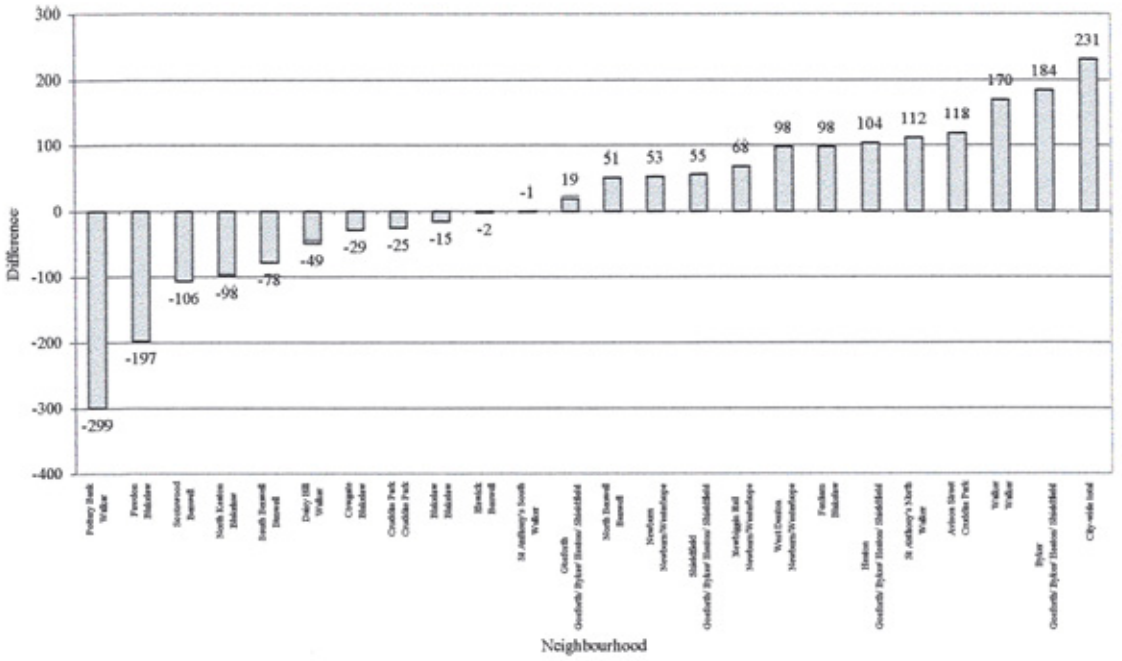


Figure 5.8 Housing Neighbourhoods: Actual differences in raw counts of occupied council housing stock 1991 Census – Local authority dataset figure

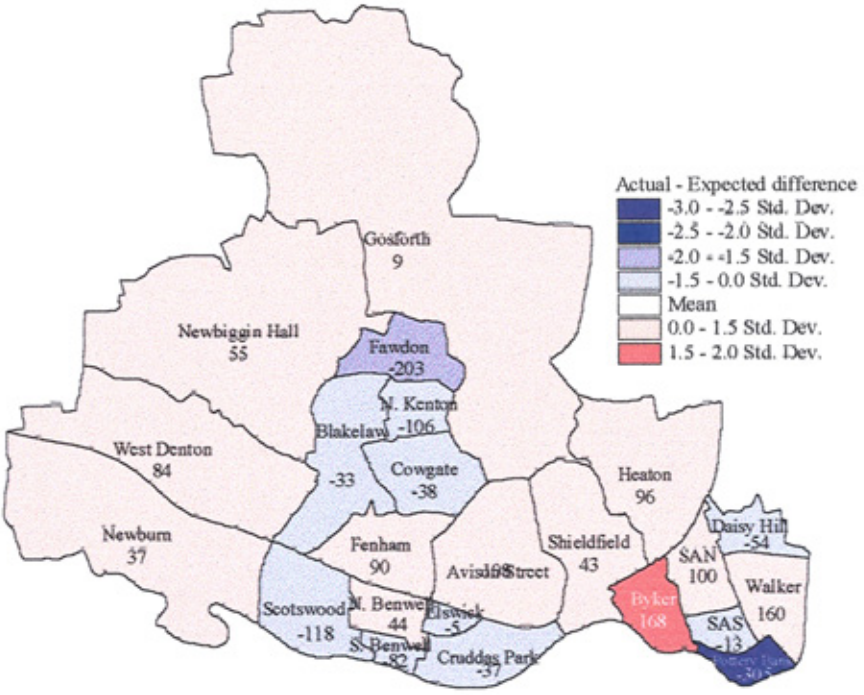


Figure 5.9 Housing Neighbourhoods: Spatial distribution of differences raw counts of occupied council housing stock: Actual – Expected Average

In Cruddas Park, Avison Street was the Neighbourhood where the Census recorded 7.75% more occupied council stock than the datasets (Table 5.8).

Area	Neighbourhood	Datasets:Sheltered Accom	1991 Census: SAS62	Datasets: Occupied Council Stock	Census - Data	Difference as % of Census	Expected Difference in Occupied dwellings	Actual – Expected difference
Walker	Pottery Bank	0	1052	1351	-299	-28.42%	6	-305
Blakelaw	Fawdon	36	1032	1229	-197	-19.09%	6	-203
Benwell	Scotswood	0	2064	2170	-106	-5.14%	12	-118
Blakelaw	North Kenton	25	1339	1437	-98	-7.32%	8	-106
Benwell	South Benwell	0	563	641	-78	-13.85%	4	-82
Walker	Daisy Hill	37	935	984	-49	-5.24%	5	-54
Blakelaw	Cowgate	0	1555	1584	-29	-1.86%	9	-38
Cruddas Park	Cruddas Park	37	1960	1985	-25	-1.28%	12	-37
Blakelaw	Blakelaw	36	2986	3001	-15	-0.50%	18	-33
Benwell	Elswick	31	582	584	-2	-0.34%	3	-5
Walker	St Anthony's South	56	1950	1951	-1	-0.05%	12	-13
G/B/H/S	Gosforth	11	1668	1649	19	1.14%	10	9
Benwell	North Benwell	0	1197	1146	51	4.26%	7	44
Newburn/Westerhope	Newburn	72	2701	2648	53	1.96%	16	37
G/B/H/S	Shieldfield	97	1936	1881	55	2.84%	12	43
Newburn/Westerhope	Newbiggin Hall	35	2207	2139	68	3.08%	13	55
Newburn/Westerhope	West Denton	59	2414	2316	98	7.30%	14	84
Blakelaw	Fenham	0	1342	1244	98	4.06%	8	90
G/B/H/S	Heaton	0	1302	1198	104	7.99%	8	96
Walker	St Anthony's North	29	1945	1833	112	5.76%	12	100
Cruddas Park	Avison Street	82	1640	1522	118	7.20%	10	108
Walker	Walker	90	1572	1402	170	10.81%	10	160
G/B/H/S	Byker	188	2718	2534	184	6.77%	16	168
City-wide total		921	38660	38429	231	0.60%	231	0

Table 5.8 Housing Neighbourhoods: Differences between occupied council housing stock figures from the Census and the datasets

5.4.2 Housing Neighbourhoods: vacant residential dwellings (all tenures)

The 12.8% (203) Census excess of vacancies (1583) compared to the dataset figure (1380) in Benwell Housing Area, was concentrated mainly in North Benwell (36%) and Scotswood (54%) Neighbourhoods (Table 5.9). Census excess of vacancies in these Neighbourhoods and Cruddas Park (25%) were among the highest in the City (Figure 5.10 and 5.11). The distribution of Census excess of vacancies (Figure 5.10) broadly corresponds to that of the social structure of the City. Elswick was the only Neighbourhood in Benwell with Census shortfall of vacancies (47%). The number of vacancies in South Benwell were similar (2%) from the datasets and the Census. The city-wide Census shortfall (33%) was distributed between 16 out of 24 Housing Neighbourhoods. Avison Street (59%), Heaton (52%) and Gosforth (55%) were the Neighbourhoods with the most Census shortfalls of vacancies.

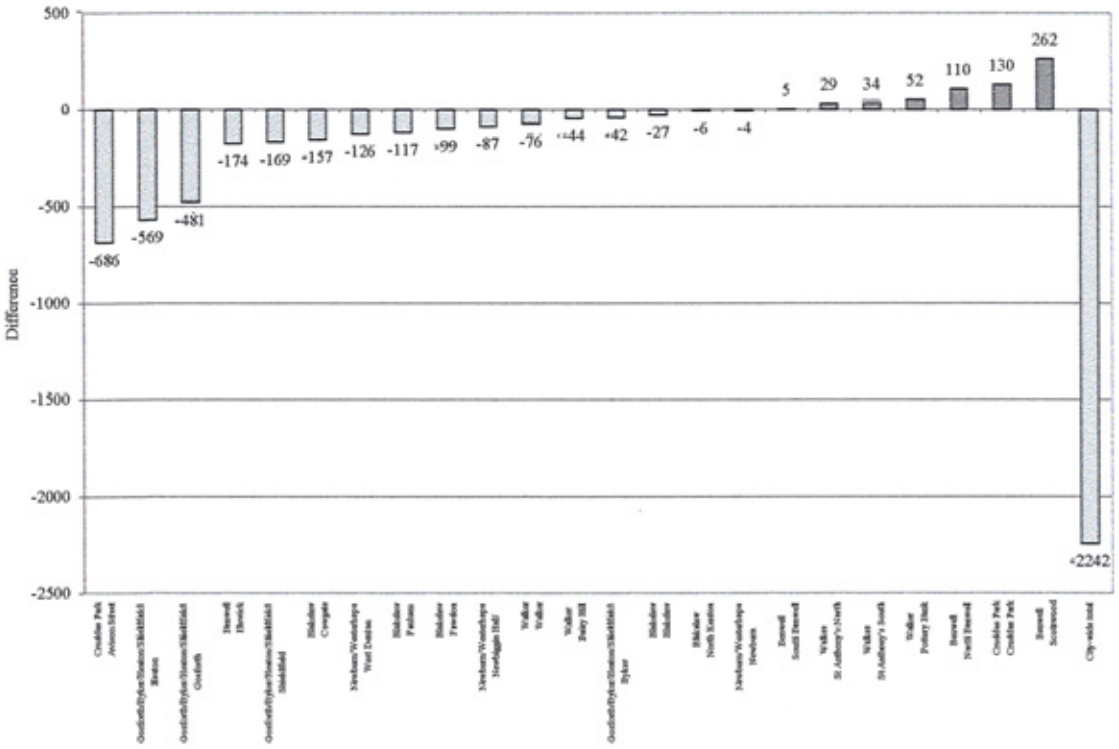


Figure 5.10 Housing Neighbourhoods: Actual differences in raw counts of vacant residential dwellings: 1991 Census – Local authority dataset figure

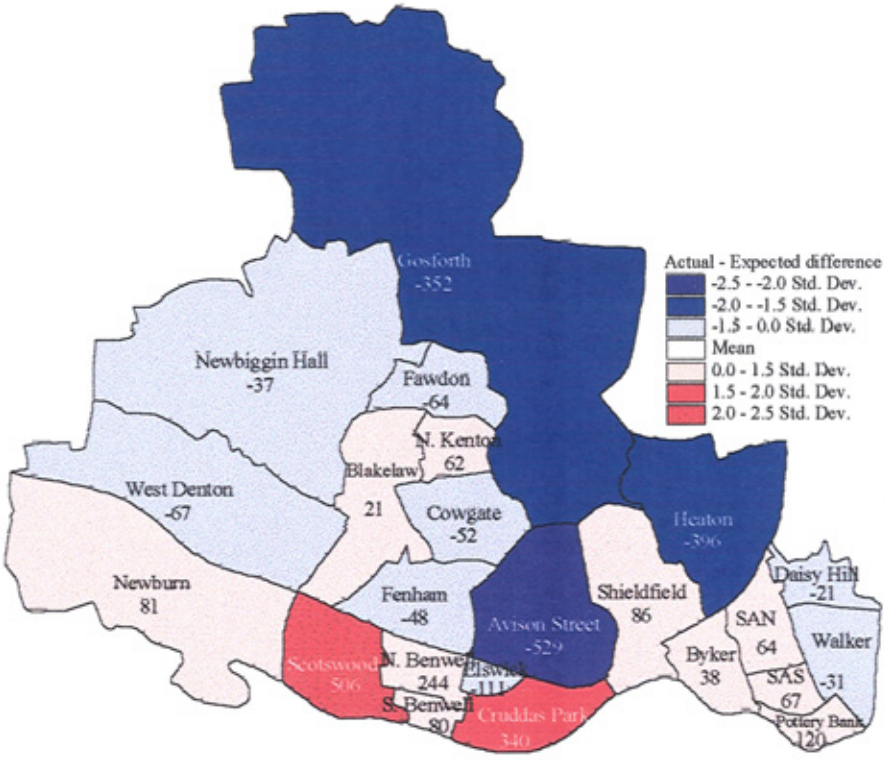


Figure 5.11 Housing Neighbourhoods: Spatial distribution of differences in vacant residential dwellings: Actual – Expected Average

Housing Area	Housing Neighbour-hood	1991 Vacant properties database	SAS61-Vacant Accom	Accom not used as main residence – no persons present	Total Census Vacant Accom	Difference in vacancy figures: Census – Datasets	Difference as % of Census figures	Expected Difference	Actual minus Expected difference
Cruddas Park	Avison Street	1166	458	22	480	-686	-142.92%	-157	-529
G/B/H/S	Heaton	1098	523	6	529	-569	-107.56%	-173	-396
G/B/H/S	Gosforth	876	380	15	395	-481	-121.77%	-129	-352
Benwell	Elswick	367	193	0	193	-174	-90.16%	-63	-111
G/B/H/S	Shieldfield	951	738	44	782	-169	-21.61%	-255	86
Blakelaw	Cowgate	480	320	3	323	-157	-48.61%	-105	-52
Newburn/ Westerhope	West Denton	307	175	6	181	-126	-69.61%	-59	-67
Blakelaw	Fenham	330	208	5	213	-117	-54.93%	-69	-48
Blakelaw	Fawdon	206	103	4	107	-99	-92.52%	-35	-64
Newburn/ Westerhope	Newbiggin Hall	241	153	1	154	-87	-56.49%	-50	-37
Walker	Walker	215	137	2	139	-76	-54.68%	-45	-31
Walker	Daisy Hill	113	68	1	69	-44	-63.77%	-23	-21
G/B/H/S	Byker	286	238	6	244	-42	-17.21%	-80	38
Blakelaw	Blakelaw	174	146	1	147	-27	-18.37%	-48	21
Blakelaw	North Kenton	213	204	3	207	-6	-2.90%	-68	62
Newburn/ Westerhope	Newburn	264	259	1	260	-4	-1.54%	-85	81
Benwell	South Benwell	224	229	0	229	5	2.18%	-75	80
Walker	St Anthony's North	79	108	0	108	29	26.85%	-35	64
Walker	St Anthony's South	66	100	0	100	34	34.00%	-33	67
Walker	Pottery Bank	158	182	28	210	52	24.76%	-68	120
Benwell	North Benwell	**302**	**411**	**1**	**412**	**110**	**26.70%**	**-134**	**244**
Cruddas Park	Cruddas Park	**513**	**640**	**3**	**643**	**130**	**20.22%**	**-210**	**340**
Benwell	Scotswood	**487**	**746**	**3**	**749**	**262**	**34.98%**	**-244**	**506**
City-wide totals		9116	6719	155	6874	-2242	**-32.62%**	**-2243**	**1**

Table 5.9 Housing Neighbourhoods: Differences between residential vacant dwelling figures from the Census and the datasets

5.4.3 Housing Neighbourhoods: all residential dwellings (occupied and vacant)

The Census District residential dwelling figure (119767) was slighlty less than the dataset figure (120215). This shortfall was more prominent in Benwell and Blakelaw Housing Areas. South Benwell (13.54%), North Benwell (2.92%) and Scotswood (1.43%) in Benwell Housing Area and Fenham (6.16%), Cowgate (5.42%) and Fawdon (3.68%) in Blakelaw were the Neighbourhoods with the most Census shortfalls of residential dwellings (Figure 5.12 and Table 5.10).

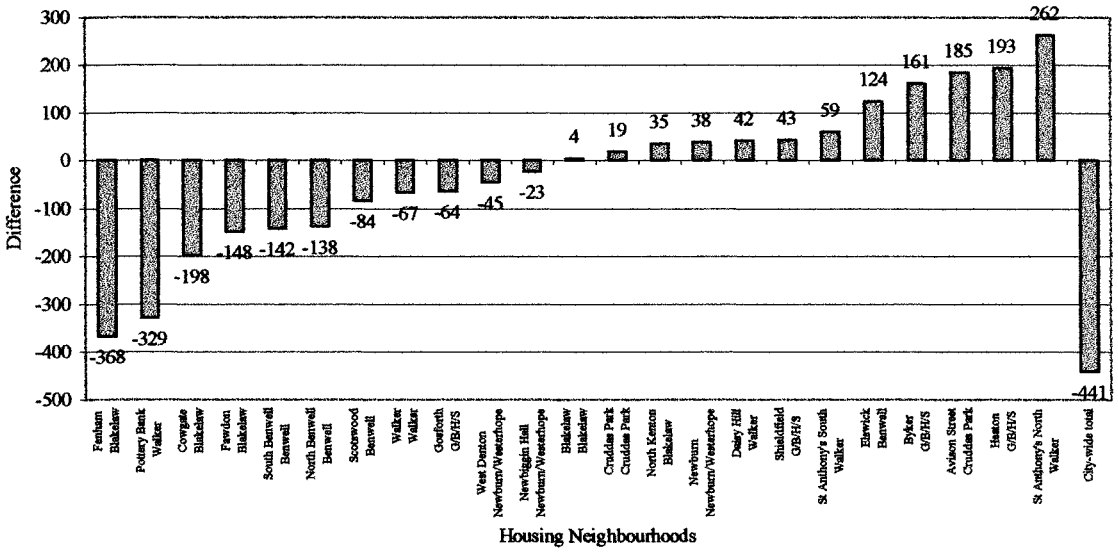


Figure 5.12 Housing Areas: Actual differences in raw counts of residential dwellings: 1991 Census – Local authority dataset figure

Housing Area	Housing Neighbourhood	Census total residential dwellings (SAS61)	1995 Gazetteer Total residential addresses	Actual difference	% actual difference	Expected average difference	Difference between actual - expected
Blakelaw	Fenham	5976	6344	-368	-6.16%	-22	-346
Walker	Pottery Bank	1462	1791	-329	-22.50%	-5	-324
Blakelaw	Cowgate	3655	3853	-198	-5.42%	-14	-185
Blakelaw	Fawdon	4024	4172	-148	-3.68%	-15	-133
Benwell	South Benwell	1049	1191	-142	-13.54%	-4	-138
Benwell	North Benwell	4725	4863	-138	-2.92%	-17	-121
Benwell	Scotswood	5892	5976	-84	-1.43%	-22	-62
Walker	Walker	3619	3686	-67	-1.85%	-13	-54
G/B/H/S	Gosforth	12727	12791	-64	-0.50%	-47	-17
Newburn/ Westerhope	West Denton	9615	9660	-45	-0.47%	-35	-10
Newburn/ Westerhope	Newbiggin Hall	3776	3799	-23	-0.61%	-14	-9
Blakelaw	Blakelaw	6614	6610	4	0.06%	-24	28
Cruddas Park	Cruddas Park	3673	3654	19	0.52%	-14	33
Blakelaw	North Kenton	3080	3045	35	1.14%	-11	46
Newburn/ Westerhope	Newburn	8341	8303	38	0.46%	-31	69
Walker	Daisy Hill	2670	2628	42	1.57%	-10	52
G/B/H/S	Shieldfield	10636	10593	43	0.40%	-39	82
Walker	St Anthony's South	2792	2733	59	2.11%	-10	69
Benwell	Elswick	1616	1492	124	7.67%	-6	130
G/B/H/S	Byker	3963	3802	161	4.06%	-15	176
Cruddas Park	Avison Street	6067	5882	185	3.05%	-22	207
G/B/H/S	Heaton	10703	10510	193	1.80%	-39	232
Walker	St Anthony's North	3099	2837	262	8.45%	-11	273
City-wide totals		119774	120215	-441	0.37%	-441	0

Table 5.10 Housing Neighbourhoods: Differences between residential dwelling figures from the Census and the datasets

The distribution of differences among Neighbourhoods, revealed those where most of the differences were concentrated. For example, in Walker area, the Census slightly underestimated residential dwellings (-33). This was higher than the expected average difference (-50). The Census shortfall was above the city average. That is, the Census had missed less dwellings than expected in this area. Pottery Bank and Walker were Neighbourhoods within Walker area where the Census had missed more dwellings than expected. The actual differences in Pottery Bank (-329) and Walker (-67) were greater than the expected differences for these Neighbourhoods (–5.38 and –13.32 respectively). The shortfall of Census residential dwelling figures was more than expected and lower than the city average (Figure 5.13).

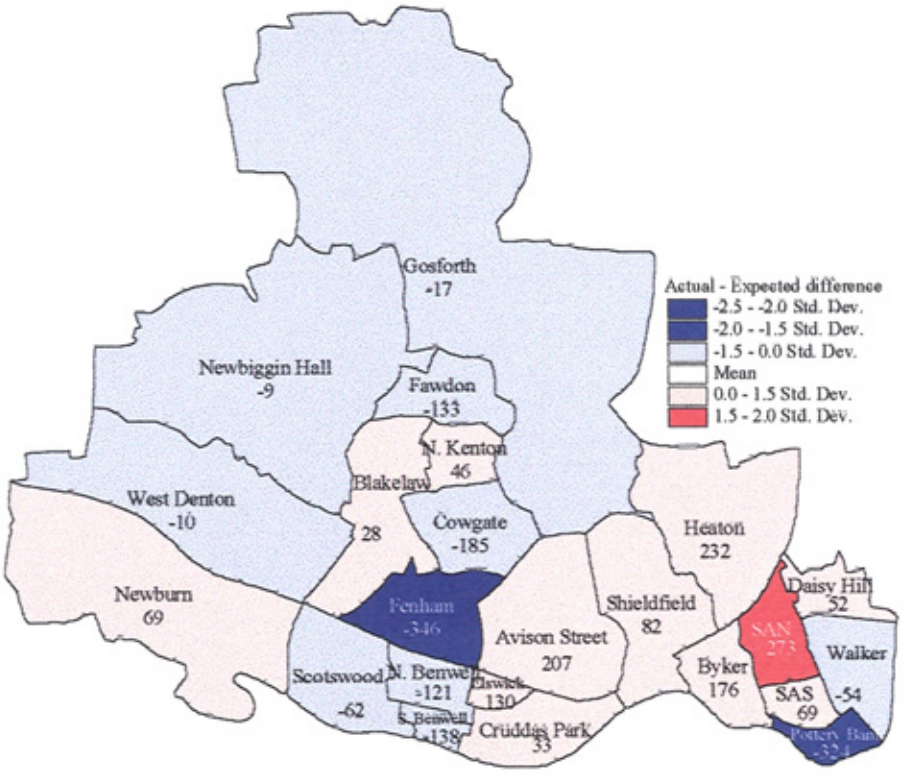


Figure 5.13 Housing Neighbourhoods: Spatial distribution of differences in residential dwellings: Actual – Expected Average

5.4.4 Housing Neighbourhoods: Summary

Six Neighbourhoods were highlighted as those where the differences for at least one of the variables were significant. Neighbourhoods were selected if the differences were at least 1.5 standard deviations above or below the expected city-wide average difference. Upon this basis, Scotswood in Benwell, Fawdon and Fenham in Blakelaw, Avison Street and Cruddas Park and Pottery Bank in Walker were selected (Figure 5.14).

In Scotswood, the Census figure of occupied council stock was lower and the total vacancy figure was noticeably higher than the dataset figures for these variables. Pottery Bank in Walker also displayed a similar pattern but the shortfall of Census figure of occupied council stock was much greater (Table 5.11). The area pattern of lower Census figures for all three variables in Blakelaw was also found in Fawdon. Fenham, also in this area, was selected because the Census figure of all residential dwellings was much lower than expected. Within Cruddas Park, Avison Street and Cruddas Park were selected because the Census vacancy figures in these Neighbourhoods varied greatly from the dataset figures.

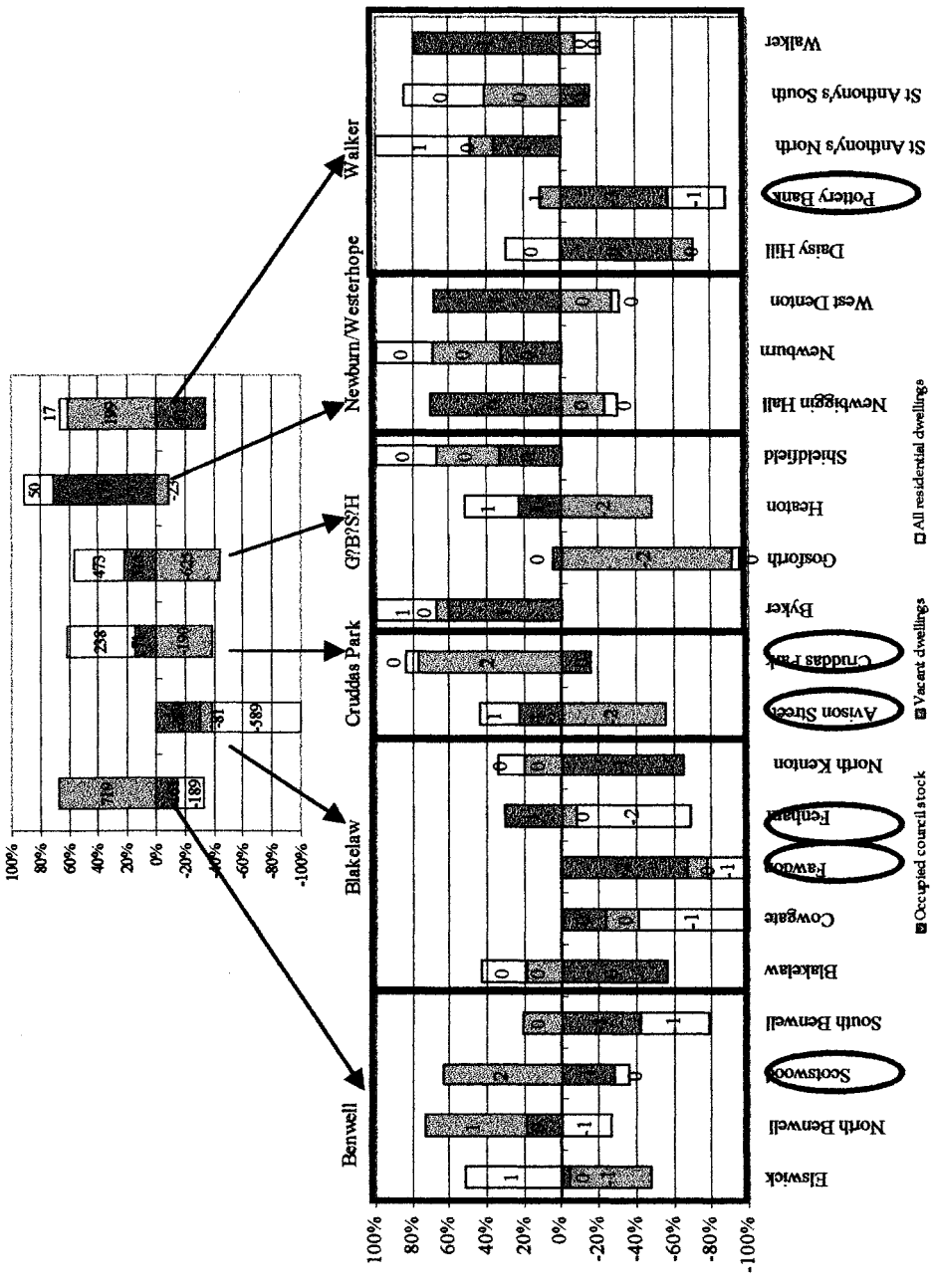


Figure 5.14 Housing Neighbourhoods: Differences in occupied council stock, vacant dwellings and all residential dwellings – Standard Deviations above and below the mean

		Occupied council stock				Residential vacancies				All residential dwellings			
		Area figures		Neighbourhood figures		Area figures		Neighbourhood figures		Area figures		Neighbour-hood figures	
Area	Neighbour-hood	A	A-E	A	A-E	A	A-E	A	A-E	A	A-E	A	A-E
Benwell	Elswick	-135	-161	-2	-5	203	719	-174	-111	-238	-189	124	130
	North Benwell			51	44			110	244			-138	-121
	Scotswood			-106	-118			**262**	**506**			-84	-62
	South Benwell			-78	-82			5	80			-142	-138
Blakelaw	Blakelaw	-240	-289	-15	-33	-406	-81	-27	21	-675	-589	4	28
	Cowgate			-29	-38			-157	-52			-198	-185
	Fawdon			**-197**	**-203**			-99	-64			-148	-133
	Fenham			98	90			-117	-48			**-368**	**-346**
	North Kenton			-98	-106			-6	62			35	46
Cruddas Park	**Avison Street**	93	71	118	108	-556	-190	**-686**	**-529**	202	238	185	207
	Cruddas Park			-25	-37			**130**	**340**			19	33
G/B/H/S	Byker	361	315	184	168	-1261	-625	-42	38	333	473	161	176
	Gosforth			19	9			-481	-352			-64	-17
	Heaton			104	96			-569	-396			193	232
	Shieldfield			55	43			-169	86			43	82
Newburn/W esterhope	Newbiggin Hall	219	175	68	55	-217	-23	-87	-37	-30	50	-23	-9
	Newburn			53	37			-4	81			38	69
	West Denton			98	84			-126	-67			-45	-10
Walker	Daisy Hill	-67	-112	-49	-54	-5	199	-44	-21	-33	17	42	52
	Pottery Bank			**-299**	**-305**			52	120			-329	-324
	St Anthony's North			112	100			29	64			262	273
	St Anthony's South			-1	-13			34	67			59	69
	Walker			170	160			-76	-31			-67	-54
City-wide totals		231	-1	231	0	-2242	-1	-2243	1	-441	0	-441	0

Table 5.11 Summary of figures for Housing Neighbourhoods, A: Actual difference, A-E: Actual –Expected difference

5.5 Wards

5.5.1 Wards: Occupied council housing stock

The city-wide Census excess of occupied council stock was concentrated in Jesmond (79%), Westerhope (17%), Moorside (9%) and Byker (4%) (Table 5.12 and Figures 5.15 and 5.16). The Census shortfall of occupied council stock was in Fawdon (15%), Scotswood (10%) and West City (3%).

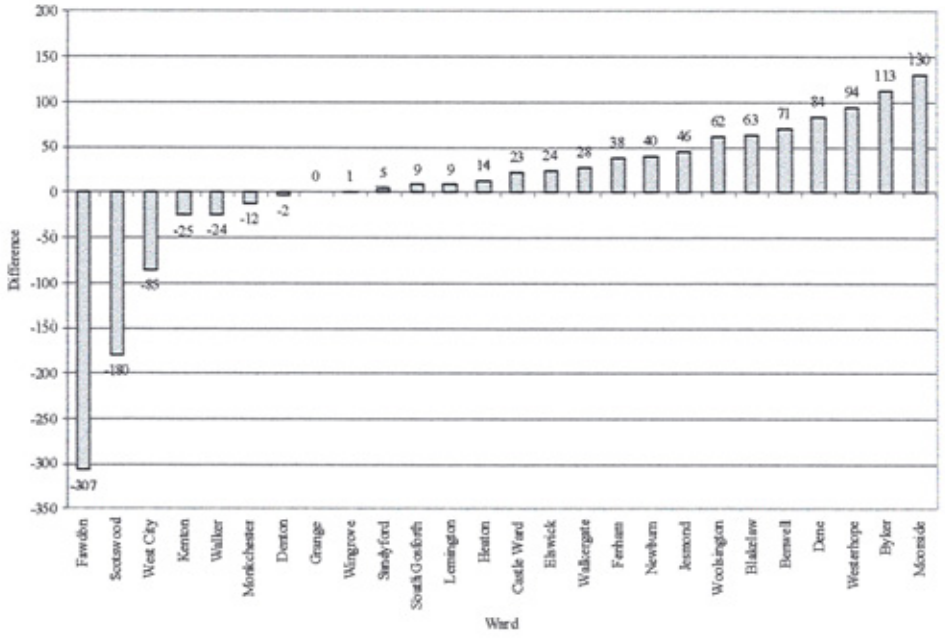


Figure 5.15 Wards: Actual differences in raw counts of occupied council housing stock: 1991 Census – Local authority dataset figure

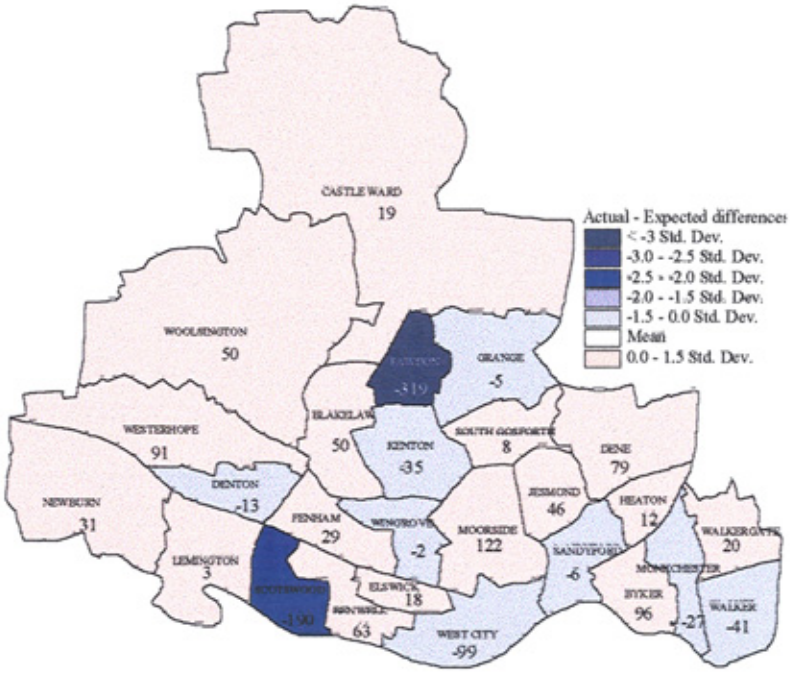


Figure 5.16 Wards: Spatial distribution of differences raw counts of occupied council housing stock: Actual – Expected Average

	Census	Local Authority Datasets						Difference			
Ward	1991 Census LBS62	Cprop dbase	Oldprop dbase	Council Stock	Shelt. Accom.	L.A vacs:	Occupied Council Stock - sheltered	Census minus Data	As % of Census figures	Expected difference	Observed minus expected
Fawdon	2124	2224	406	2630	61	138	2431	-307	-14.45%	12	-319
Scotswood	1737	1583	577	2160	0	243	1917	-180	-10.36%	10	-190
West City	2487	2791	302	3093	37	484	2572	-85	-3.42%	14	-99
Kenton	1712	1706	294	2000	0	263	1737	-25	-1.46%	10	-35
Walker	3015	3122	78	3200	48	113	3039	-24	-0.80%	17	-41
Monkchester	2706	2864	20	2884	76	90	2718	-12	-0.44%	15	-27
Denton	1866	1904	41	1945	26	51	1868	-2	-0.11%	11	-13
Grange	961	960	31	991	11	19	961	0	0.00%	5	-5
Wingrove	552	546	10	556	0	5	551	1	0.18%	3	-2
Sandyford	1875	1914	85	1999	66	63	1870	5	0.27%	11	-6
South Gosforth	103	95	1	96	0	2	94	9	8.74%	1	8
Lemington	1112	1130	28	1158	31	24	1103	9	0.81%	6	3
Heaton	378	366	4	370	0	6	364	14	3.70%	2	12
Castle Ward	697	675	15	690	0	16	674	23	3.30%	4	19
Elswick	987	1007	102	1109	31	115	963	24	2.43%	6	18
Walkergate	1368	1442	12	1454	88	26	1340	28	2.05%	8	20
Fenham	1555	1574	20	1594	36	41	1517	38	2.44%	9	29
Newburn	1585	1556	65	1621	41	35	1545	40	2.52%	9	31
Jesmond	58	40	6	46	31	3	12	46	79.31%	0	46
Woolsington	2202	2231	128	2359	35	184	2140	62	2.82%	12	50
Blakelaw	2247	2184	38	2222	0	38	2184	63	2.80%	13	50
Benwell	1341	1287	73	1360	0	90	1270	71	5.29%	8	63
Dene	918	827	19	846	0	12	834	84	9.15%	5	79
Westerhope	541	481	8	489	33	9	447	94	17.38%	3	91
Byker	3071	3189	10	3199	188	53	2958	113	3.68%	17	96
Moorside	1450	1436	19	1455	82	53	1320	130	8.97%	8	122
City totals	38648	39134	2392	41526	921	2176	38429	219	0.57%	219	0

Table 5.12 Wards: Differences between occupied council housing stock figures: 1991 Census - the datasets

5.5.2 Wards: vacant residential dwellings (all tenures)

The city-wide 33% shortfall of Census vacancies was largely due to definitional differences. This pattern was reproduced (Figure 5.17) in all Wards except Scotswood (36%), Monkchester (34%), Benwell (22%), Newburn (9%). Census excess of vacancies was found in Moorside (240%), Grange (202%) and Dene (175%), which was also mainly due to definitional differences (Figure 5.18). These were Wards with large numbers of student accommodation and halls of residence. In West City, the Census vacancy figure was much more than expected (Table 5.13). The Census excess of vacancies was concentrated in the Quayside area where there are a large number of businesses. West City Ward was ranked as 6th among 25 national Wards with the highest residual non-response. As such, questions were raised about possible links

between large non-response adjustments and the Census excess of vacancies in this Ward. This was further investigated in the correlation analysis (Section 5.8.5). The implications of this are discussed more fully in Chapter 7 (Section 7.4).

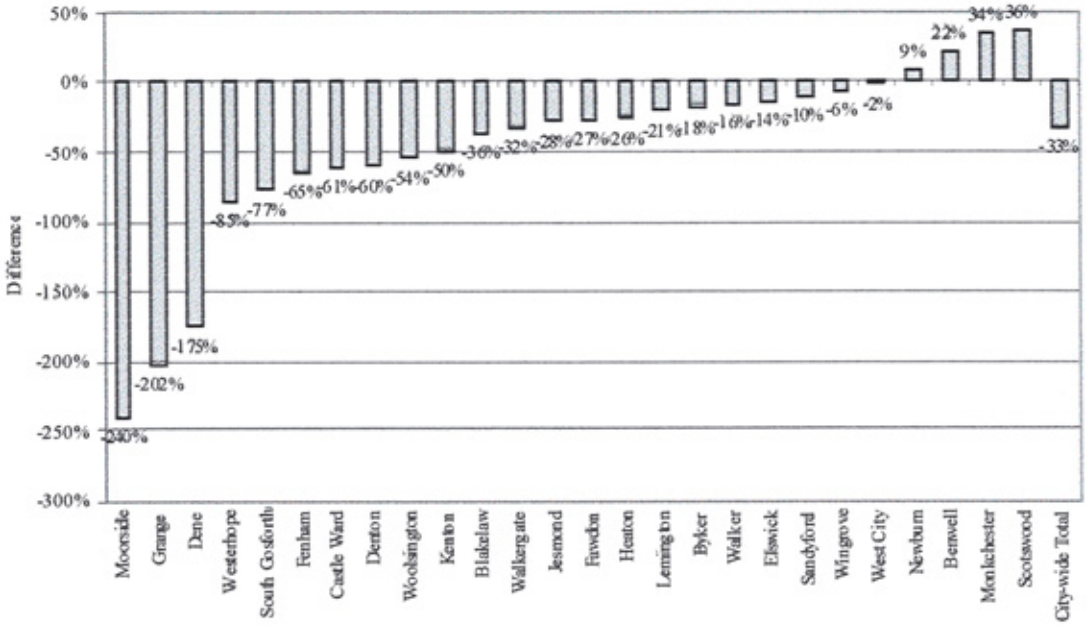


Figure 5.17 Wards: Actual differences as % of Census counts of vacant residential dwellings: 1991 Census – Local authority dataset figure

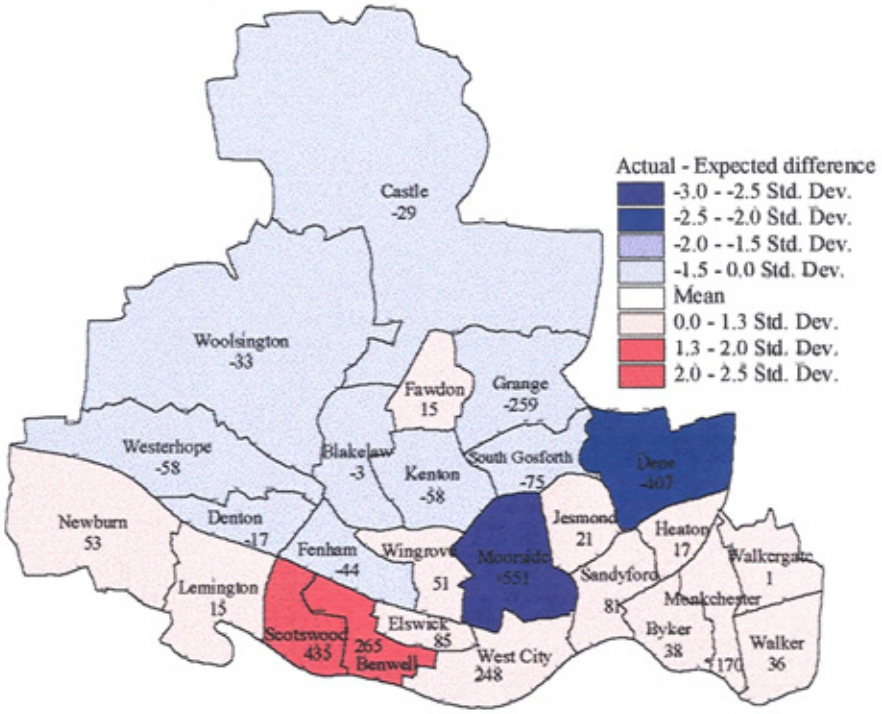


Figure 5.18 Wards: Spatial distribution of differences in vacant residential dwellings: Actual – Expected Average

Ward	LBS61-Vacant Accom	Vacant second homes	Total Census Vacancies	1991 Vacant properties database	Census minus Datasets	Difference as percentage of Census records	Expected Difference	Observed – Expected difference
Moorside	248	18	266	904	-638	-239.8%	-87	-551
Dene	285	2	287	788	-501	-174.6%	-94	-407
Grange	148	5	153	462	-309	-202.0%	-50	-259
Kenton	335	4	339	508	-169	-49.9%	-111	-58
South Gosforth	163	8	171	302	-131	-76.6%	-56	-75
Jesmond	409	27	436	558	-122	-28.0%	-143	21
Westerhope	107	5	112	207	-95	-84.8%	-37	-58
Fenham	138	0	138	227	-89	-64.5%	-45	-44
Woolsington	156	1	157	242	-85	-54.1%	-52	-33
Fawdon	262	5	267	340	-73	-27.3%	-88	15
Heaton	243	3	246	310	-64	-26.0%	-81	17
Castle Ward	93	8	101	163	-62	-61.4%	-33	-29
Elswick	445	0	445	506	-61	-13.7%	-146	85
Walkergate	147	2	149	197	-48	-32.2%	-49	1
Byker	253	7	260	307	-47	-18.1%	-85	38
Denton	62	0	62	99	-37	-59.7%	-20	-17
Sandyford	338	19	357	393	-36	-10.1%	-117	81
Walker	211	2	213	247	-34	-16.0%	-70	36
Blakelaw	92	0	92	125	-33	-35.9%	-30	-3
Lemington	122	0	122	147	-25	-20.5%	-40	15
West City	795	1	796	809	-13	-1.6%	-261	248
Wingrove	188	5	193	205	-12	-6.2%	-63	51
Newburn	**127**	**1**	**128**	**117**	**11**	**8.6%**	**-42**	**53**
Monkchester	**223**	**30**	**253**	**166**	**87**	**34.4%**	**-83**	**170**
Benwell	**485**	**1**	**486**	**381**	**105**	**21.6%**	**-160**	**265**
Scotswood	**630**	**3**	**633**	**406**	**227**	**35.9%**	**-208**	**435**
City totals	6705	157	6862	9116	-2254	-32.8%	-2251	-3.00

Table 5.13 Wards: Differences between residential vacant dwelling figures from the Census and the datasets

5.5.3 Wards: all residential dwellings (occupied and vacant)

The Census shortfall of total dwelling figure was the highest in West City (7%), where most businesses were located (Figures 5.19 and 5.20). The same pattern was found (Table 5.14).in Fawdon (5%), Fenham (3%), Kenton (3%) and Grange (2%). Census excess of dwellings were found in Dene (4%), Blakelaw (3%) and Castle Ward (2%).

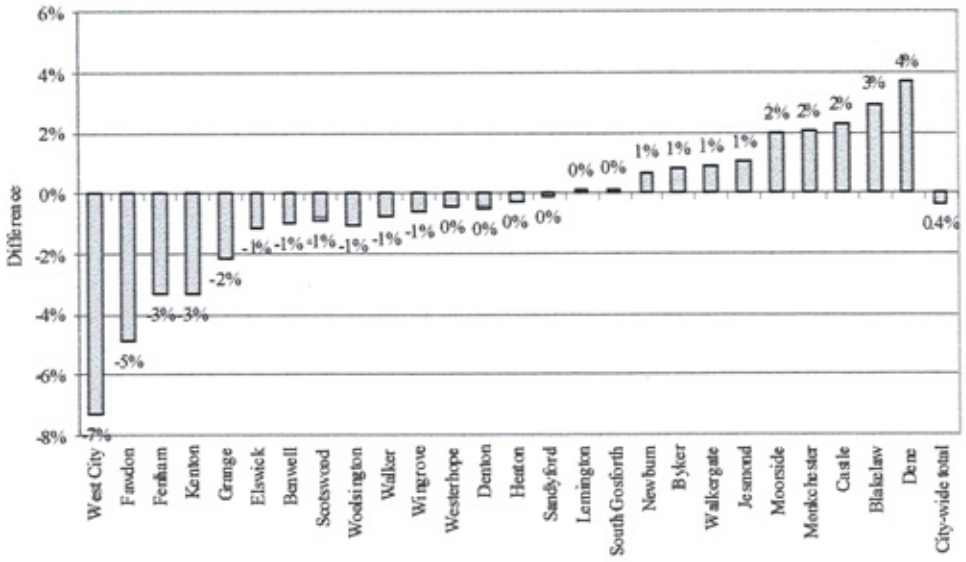


Figure 5.19 Wards: Actual differences as % of Census counts of residential dwellings: 1991 Census – Local authority dataset figure

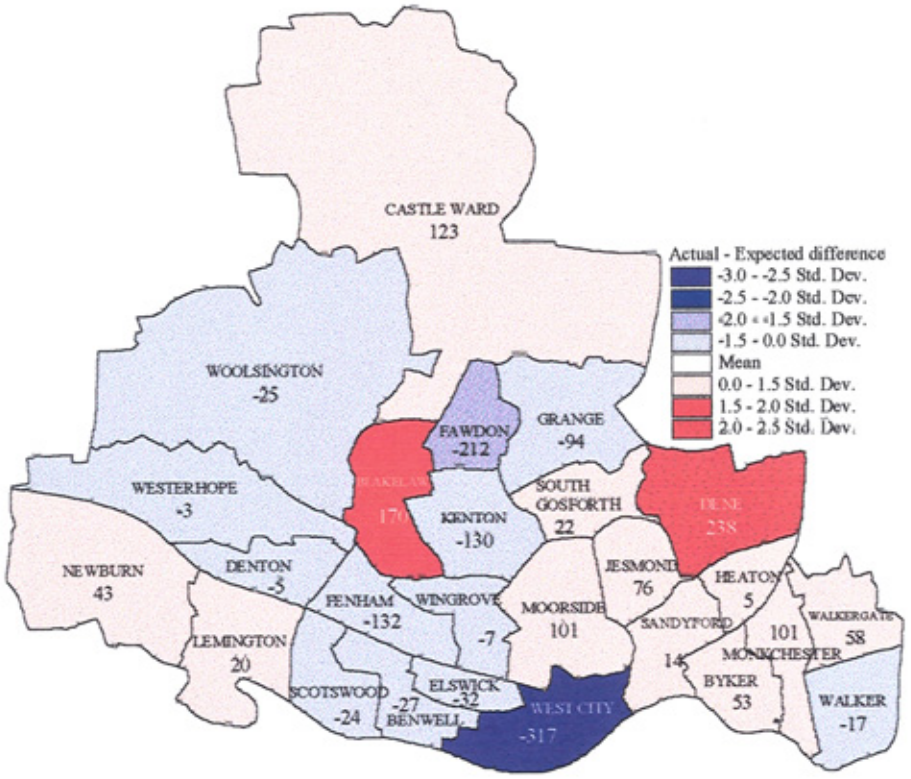


Figure 5.20 Wards: Spatial distribution of differences in residential dwellings: Actual – Expected Average

Ward	Census total residential dwellings (LBS61)	1995 Gazetteer Total residential addresses	Actual difference	% actual difference	Expected average difference	Difference between actual - expected
West City	4602	4936	-334	-7.26%	-17.21	-316.79
Fawdon	4674	4903	-229	-4.90%	-17.48	-211.52
Fenham	4475	4624	-149	-3.33%	-16.74	-132.26
Kenton	4464	4611	-147	-3.29%	-16.70	-130.30
Grange	5285	5399	-114	-2.16%	-19.77	-94.23
Elswick	4248	4296	-48	-1.13%	-15.89	-32.11
Benwell	4402	4445	-43	-0.98%	-16.47	-26.53
Scotswood	4236	4276	-40	-0.94%	-15.85	-24.15
Woolsington	3769	3808	-39	-1.03%	-14.10	-24.90
Walker	4157	4190	-33	-0.79%	-15.55	-17.45
Wingrove	4216	4239	-23	-0.55%	-15.77	-7.23
Westerhope	5159	5181	-22	-0.43%	-19.30	-2.70
Denton	4446	4468	-22	-0.49%	-16.63	-5.37
Heaton	4869	4882	-13	-0.27%	-18.21	5.21
Sandyford	5431	5437	-6	-0.11%	-20.32	14.32
Lemington	4229	4225	4	0.09%	-15.82	19.82
South Gosforth	4396	4390	6	0.14%	-16.44	22.44
Newburn	4106	4078	28	0.68%	-15.36	43.36
Byker	4607	4571	36	0.78%	-17.23	53.23
Walkergate	4624	4583	41	0.89%	-17.30	58.30
Jesmond	5212	5156	56	1.07%	-19.50	75.50
Moorside	4318	4233	85	1.97%	-16.15	101.15
Monkchester	4218	4133	85	2.02%	-15.78	100.78
Castle	4660	4554	106	2.27%	-17.43	123.43
Blakelaw	5120	4969	151	2.95%	-19.15	170.15
Dene	5844	5628	216	3.70%	-21.86	237.86
City-wide totals	119767	120215	-448	-0.37%	-448	0

Table 5.14 Wards: Differences between residential dwelling figures from the Census and the datasets

5.5.4 Wards: Summary

Fawdon, West City, Scotswood, Moorside, Dene and Grange were highlighted because the differences in variable counts were noticeably above or below the city average (Figure 5.21). In Fawdon, Census shortfall of figures was found for all three variables. In West City, the vacancy figures were similar but Census shortfalls of occupied council and all dwelling figures were found. In Scotswood there was Census excess of vacancies but similar total residential dwelling figures. Census excess of occupied council stock and total residential dwelling figures and shortfall of vacancies was found in Moorside and Dene. In Grange, there was significant Census shortfall of vacancies, but similar occupied council stock figures. Benwell was also investigated because of the Census excess of vacant and occupied council stock figures. The Census total number

of residential dwellings in this Ward were only slightly (0.98%) lower than the dataset figure (Table 5.15).

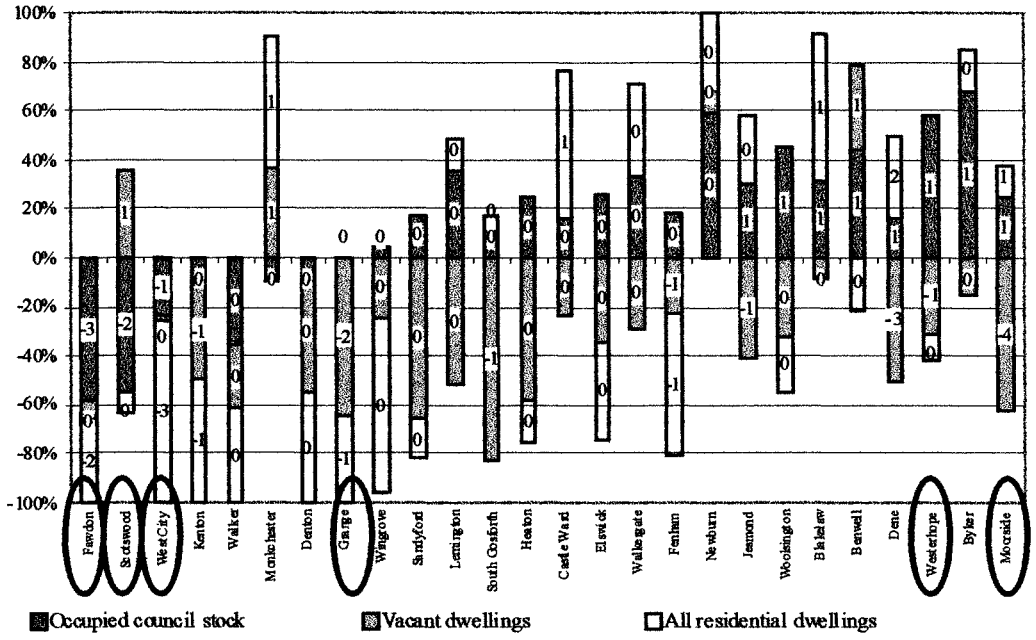


Figure 5.21 Actual minus expected differences: standard deviations above or below the city-wide average

	Occupied council stock			Vacant dwellings			All residential dwellings		
Ward	Census minus Data	Difference as % of Census	Actual – exp.	Census – Datasets	Difference as % of Census	Actual – exp.	Actual diff.	% of actual diff.	Actual – exp.
Benwell	**71**	**5.29%**	**63**	**105**	**21.60%**	**265**	**-43**	**-0.98%**	**-27**
Blakelaw	**63**	**2.80%**	**50**	**-33**	**-35.90%**	**-3**	**151**	**2.95%**	**170**
Byker	**113**	**3.68%**	**96**	**-47**	**-18.10%**	**38**	**36**	**0.78%**	**53**
Castle Ward	**23**	**3.30%**	**19**	**-62**	**-61.40%**	**-29**	**106**	**2.27%**	**123**
Dene	**84**	**9.15%**	**79**	**-501**	**-174.60%**	**-407**	**216**	**3.70%**	**238**
Denton	-2	-0.11%	-13	-37	-59.70%	-17	-22	-0.49%	-5
Elswick	**24**	**2.43%**	**18**	**-61**	**-13.70%**	**85**	**-48**	**-1.13%**	**-32**
Fawdon	**-307**	**-14.45%**	**-319**	**-73**	**-27.30%**	**15**	**-229**	**-4.90%**	**-212**
Fenham	**38**	**2.44%**	**29**	**-89**	**-64.50%**	**-44**	**-149**	**-3.33%**	**-132**
Grange	**0**	**0.00%**	**-5**	**-309**	**-202.00%**	**-259**	**-114**	**-2.16%**	**-94**
Heaton	14	3.70%	12	-64	-26.00%	17	-13	-0.27%	5
Jesmond	46	79.31%	46	-122	-28.00%	21	56	1.07%	76
Kenton	-25	-1.46%	-35	-169	-49.90%	-58	-147	-3.29%	-130
Lemington	9	0.81%	3	-25	-20.50%	15	4	0.09%	20
Monkchester	**-12**	**-0.44%**	**-27**	**87**	**34.40%**	**170**	**85**	**2.02%**	**101**
Moorside	**130**	**8.97%**	**122**	**-638**	**-239.80%**	**-551**	**85**	**1.97%**	**101**
Newburn	40	2.52%	31	11	8.60%	53	28	0.68%	43
Sandyford	5	0.27%	-6	-36	-10.10%	81	-6	-0.11%	14
Scotswood	**-180**	**-10.36%**	**-190**	**227**	**35.90%**	**435**	**-40**	**-0.94%**	**-24**
South Gosforth	9	8.74%	8	-131	-76.60%	-75	6	0.14%	22
Walker	-24	-0.80%	-41	-34	-16.00%	36	-33	-0.79%	-17
Walkergate	28	2.05%	20	-48	-32.20%	1	41	0.89%	58
West City	**-85**	**-3.42%**	**-99**	**-13**	**-1.60%**	**248**	**-334**	**-7.26%**	**-317**
Westerhope	**94**	**17.38%**	**91**	**-95**	**-84.80%**	**-58**	**-22**	**-0.43%**	**-3**
Wingrove	1	0.18%	-2	-12	-6.20%	51	-23	-0.55%	-7
Woolsington	62	2.82%	50	-85	-54.10%	-33	-39	-1.03%	-25
City totals	219	0.57%	0	-2254	-32.80%	-3	-448	-0.37%	0

Table 5.15 Summary of all variables at Ward resolution

5.6 EDs

5.6.1 EDs: Occupied council housing stock

The Census figures for this part of the analysis were obtained from SAS62 tables (38660). Due to Barnardisation [12], these figures were slightly higher than those (LBS62) provided for all Wards in the City (38648). The distribution pattern of differences in occupied council stock figures at the ED resolutions was similar to that at the Ward resolution (Figure 5.22).

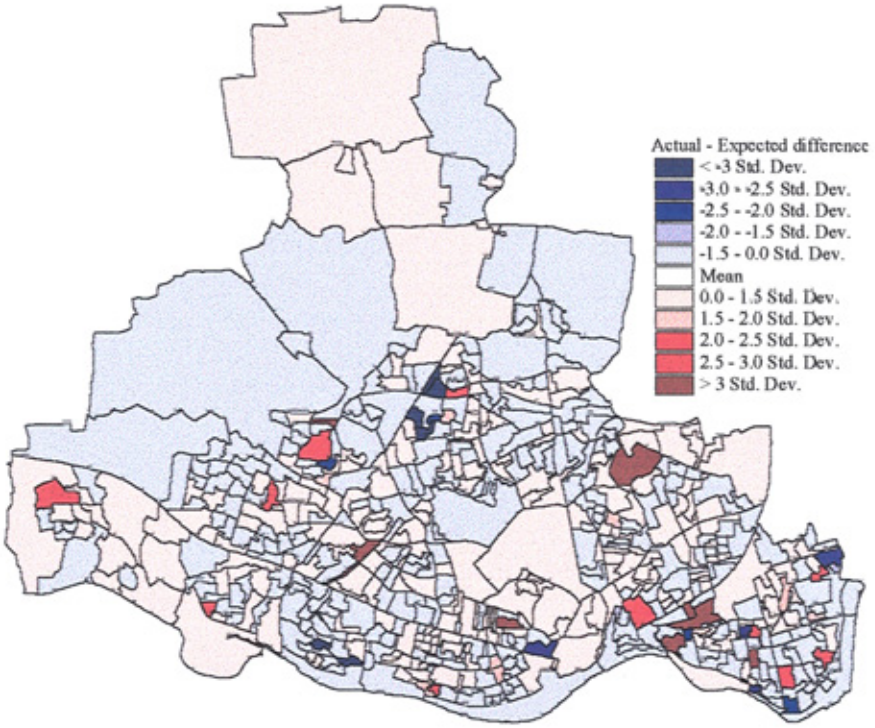


Figure 5.22 EDs: Distribution of differences in occupied council stock figures: 1991 Census – Local authority data

The Census figures of occupied council housing stock were lower than the dataset figures in 31% of the EDs and higher than the dataset figures in 45% of the EDs in the City. The figures in the remaining 22% of the EDs were the same (Figure 5.23). A significant proportion (41%) of EDs with lower Census counts (in comparison with the local authority figures), were concentrated in West City, Walker, Scotswood, Fawdon, (Figure 5.24). The opposite pattern was observed in Moorside, Dene, Jesmond and Blakelaw, where the Census recorded more occupied council stock than the datasets.

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[12] The modification of SAS figures, by the addition of 0, +1 or -1 to the original counts, is known as 'Barnardisation'. This was to avoid the breach of confidentiality (OPCS/GRO(S), 1991b).

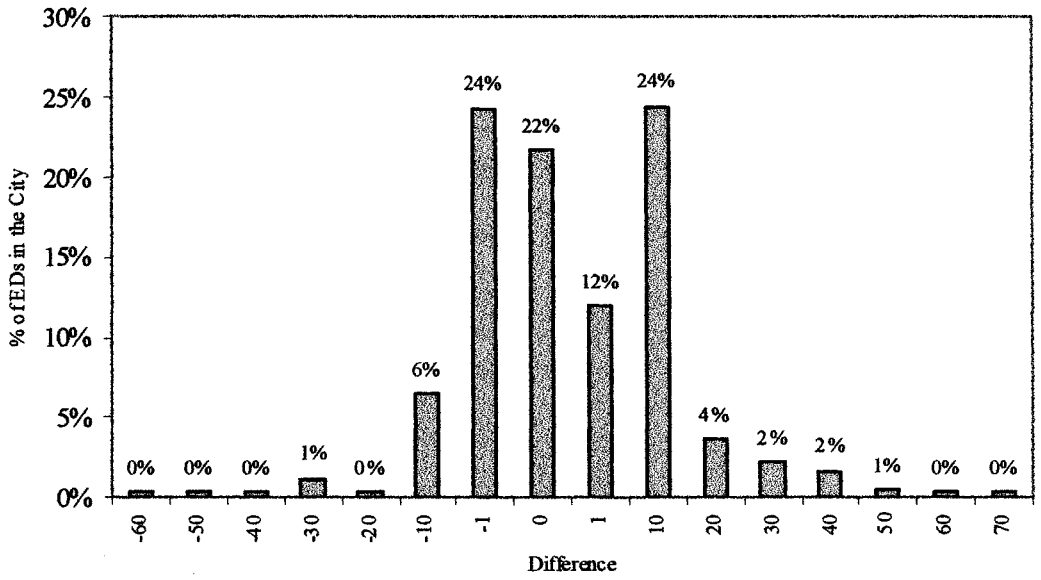


Figure 5.23 All EDs: Difference between occupied council stock figures: 1991 Census – Local Authority datasets

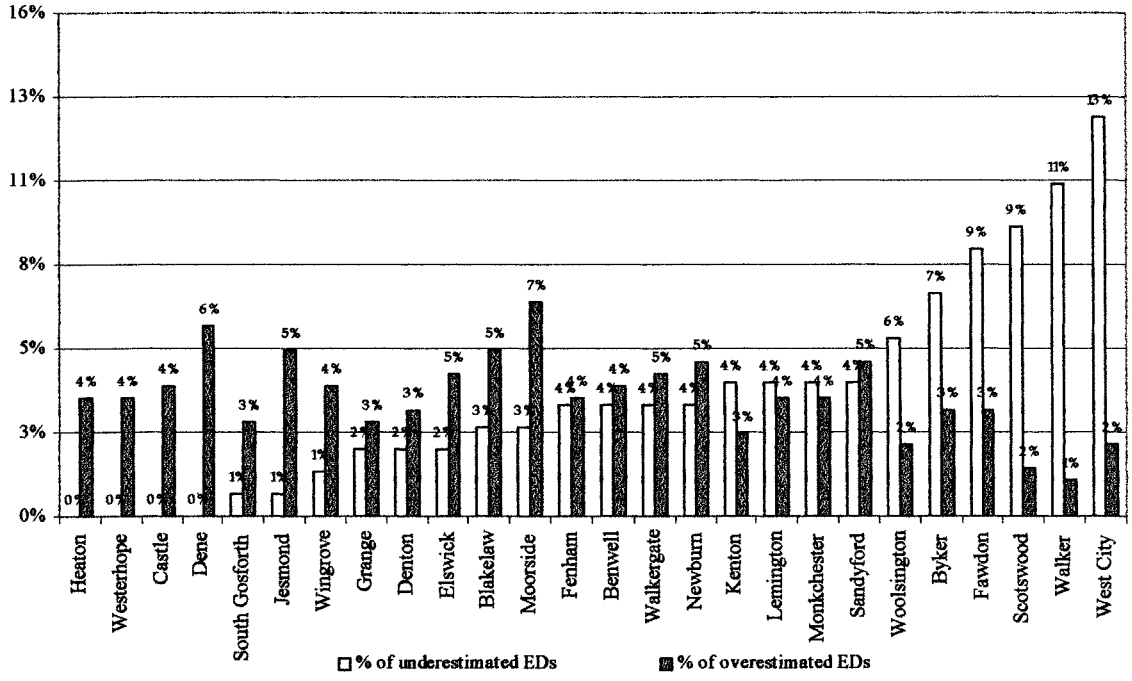


Figure 5.24 Distribution of the excess and shortfall of Census occupied council stock figures, in comparison with the dataset figures

In Benwell and Scotswood, the Census figures were lower than the dataset figures in over half (54%) of the EDs, but most of these were small differences. The opposite pattern was observed in 36% of the EDs (Figure 5.25).

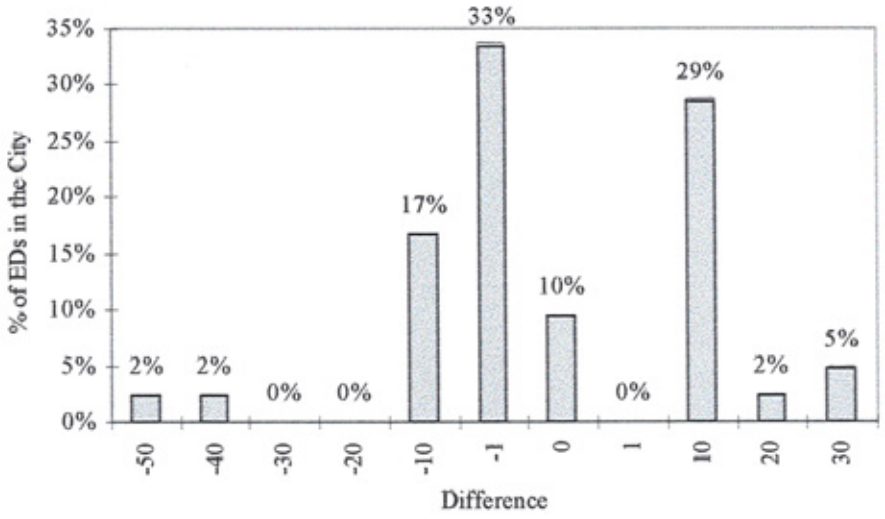


Figure 5.25 Benwell & Scotswood EDs: Differences in occupied council housing stock: 1991 Census - LA Datasets

Significant differences were found in four EDs (CJFU19, CJFU13, CJFA08, and CJFA17) where the Census counts were much lower than the dataset figures. In Benwell, the Census excess of occupied council stock in three EDs (CJFA21, CJFA20 and CJFA13) was found to be much higher than expected (Figure 5.26 and Table 5.16).

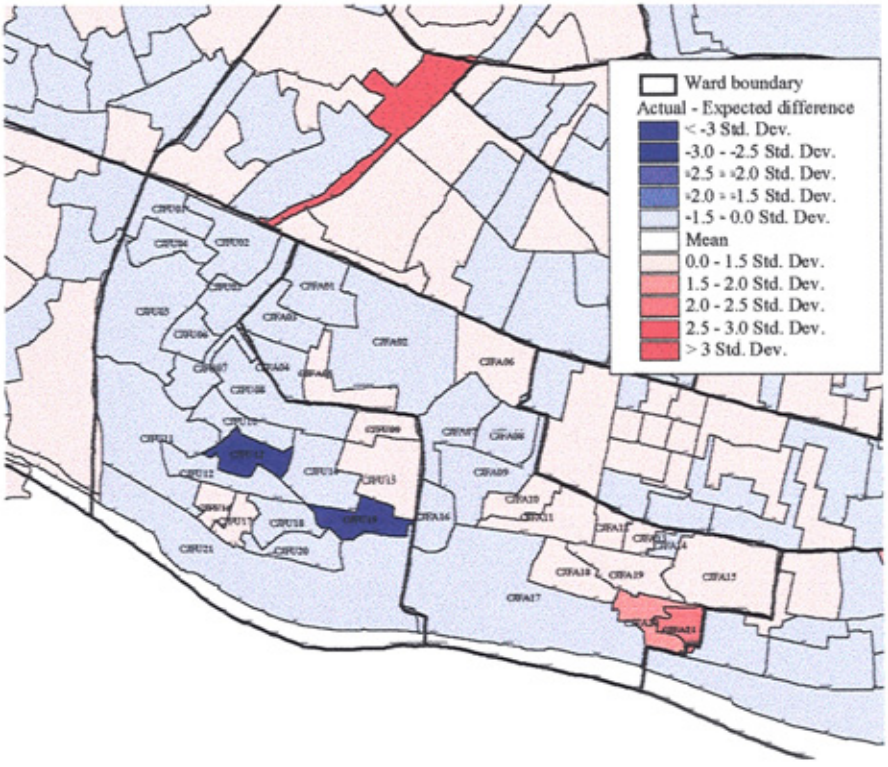


Figure 5.26 Benwell and Scotswood EDs: Distribution of differences in occupied council stock figures: 1991 Census – Local Authority datasets

		Census	Local Authority Datasets						Difference		
Ward	ED code	SAS62	Cprop dbase	Oldprop dbase	Council Stock	Sheltered Accom.	vacancies	Occupied Council Stock - sheltered excluded	Actual: Census - Data	Expected Difference	Observed – Expected
Scotswood	CJFU19	86	51	96	147	0	4	143	-57	1	-58
Scotswood	CJFU13	143	107	99	206	0	20	186	-43	1	-44
Scotswood	CJFU12	126	100	48	148	0	4	144	-18	1	-19
Benwell	CJFA08	186	204	0	204	0	2	202	-16	1	-17
Scotswood	CJFU14	112	115	40	155	0	27	128	-16	1	-17
Benwell	CJFA17	102	121	6	127	0	10	117	-15	1	-16
Scotswood	CJFU11	150	167	6	173	0	8	165	-15	1	-16
Scotswood	CJFU20	114	104	78	182	0	55	127	-13	1	-14
Benwell	CJFA16	90	109	0	109	0	7	102	-12	1	-13
Scotswood	CJFU21	147	133	51	184	0	28	156	-9	1	-10
Scotswood	CJFU18	116	61	127	188	0	64	124	-8	1	-9
Scotswood	CJFU08	118	128	1	129	0	5	124	-6	1	-7
Scotswood	CJFU07	193	205	0	205	0	6	199	-6	1	-7
Scotswood	CJFU03	17	21	0	21	0	0	21	-4	0	-4
Scotswood	CJFU10	190	195	9	204	0	11	193	-3	1	-4
Scotswood	CJFU05	29	32	0	32	0	0	32	-3	0	-3
Benwell	CJFA04	46	49	0	49	0	0	49	-3	0	-3
Benwell	CJFA14	11	14	0	14	0	0	14	-3	0	-3
Scotswood	CJFU02	12	15	0	15	0	1	14	-2	0	-2
Benwell	CJFA02	2	4	0	4	0	0	4	-2	0	-2
Scotswood	CJFU06	46	48	0	48	0	0	48	-2	0	-2
Benwell	CJFA09	37	40	0	40	0	1	39	-2	0	-2
Benwell	CJFA07	90	91	1	92	0	1	91	-1	1	-2
Scotswood	CJFU04	0	0	0	0	0	0	0	0	0	0
Scotswood	CJFU01	0	0	0	0	0	0	0	0	0	0
Benwell	CJFA01	0	0	0	0	0	0	0	0	0	0
Benwell	CJFA03	0	0	0	0	0	0	0	0	0	0
Benwell	CJFA12	56	55	3	58	0	4	54	2	0	2
Benwell	CJFA11	29	26	1	27	0	1	26	3	0	3
Scotswood	CJFU17	31	17	16	33	0	5	28	3	0	3
Scotswood	CJFU09	58	55	1	56	0	2	54	4	0	4
Benwell	CJFA05	4	0	0	0	0	0	0	4	0	4
Benwell	CJFA06	162	156	2	158	0	1	157	5	1	4
Benwell	CJFA10	6	1	0	1	0	0	1	5	0	5
Scotswood	CJFU15	22	14	5	19	0	3	16	6	0	6
Scotswood	CJFU16	20	13	0	13	0	0	13	7	0	7
Benwell	CJFA19	170	161	0	161	0	1	160	10	1	9
Benwell	CJFA15	94	89	0	89	0	5	84	10	1	9
Benwell	CJFA18	16	6	0	6	0	0	6	10	0	10
Benwell	CJFA13	47	28	0	28	0	0	28	19	0	19
Benwell	CJFA20	99	88	2	90	0	14	76	23	1	22
Benwell	CJFA21	87	42	57	99	0	42	57	30	1	29
Benwell & Scotswood		3064	2865	649	3508	0	332	3176	-112	20	-138
City-wide totals		38660	39134	2392	41526	921	2176	38429	231	223	8

Table 5.16 Benwell and Scotswood EDs: Differences in occupied council housing stock: 1991 Census - LA Datasets

5.6.2 EDs: vacant residential dwellings (all tenures)

The Census vacancy figures in the City (6862), were significantly lower than those from the datasets (9116). Benwell, Scotswood and Monkchester were among the Wards with the opposite pattern. As expected, the distribution of differences at the ED resolution was similar to that at the Ward resolution (Figure 5.27).

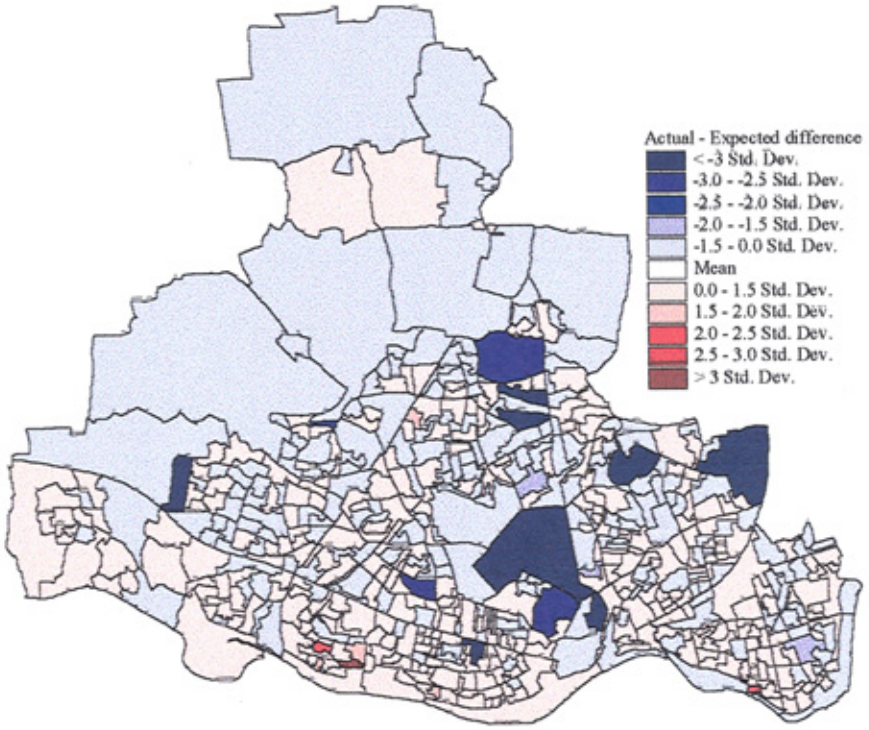


Figure 5.27 EDs: Distribution of vacancy differences: 1991 Census – 1991 Vacant properties database

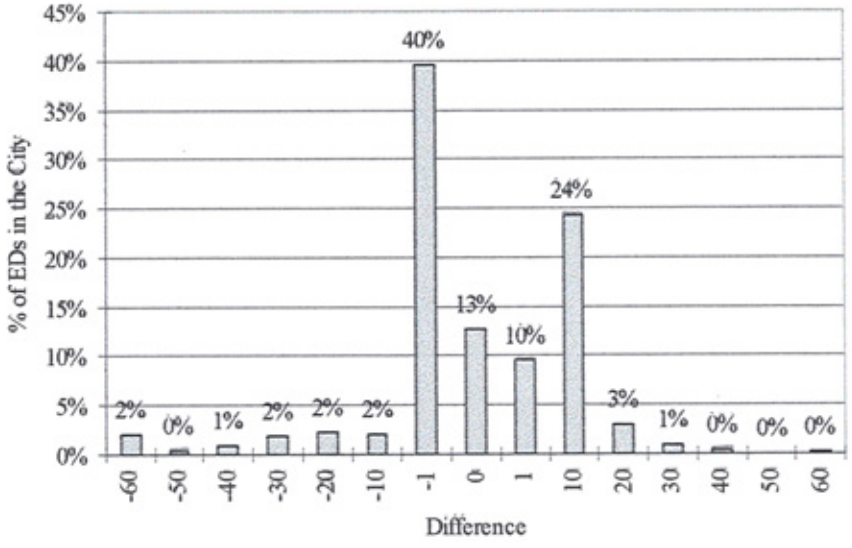


Figure 5.28 All EDs: Differences in vacant residential dwellings: 1991 Census - 1991 Vacant Properties Database

A significant proportion (38%) of the EDs in the City were found with higher Census vacancy figures than those from the datasets (Figure 5.28) and the majority of these were located in Benwell, Scotswood and West City. Similar patterns were found in EDs within Walker, Byker and Monkchester (Figure 5.29).

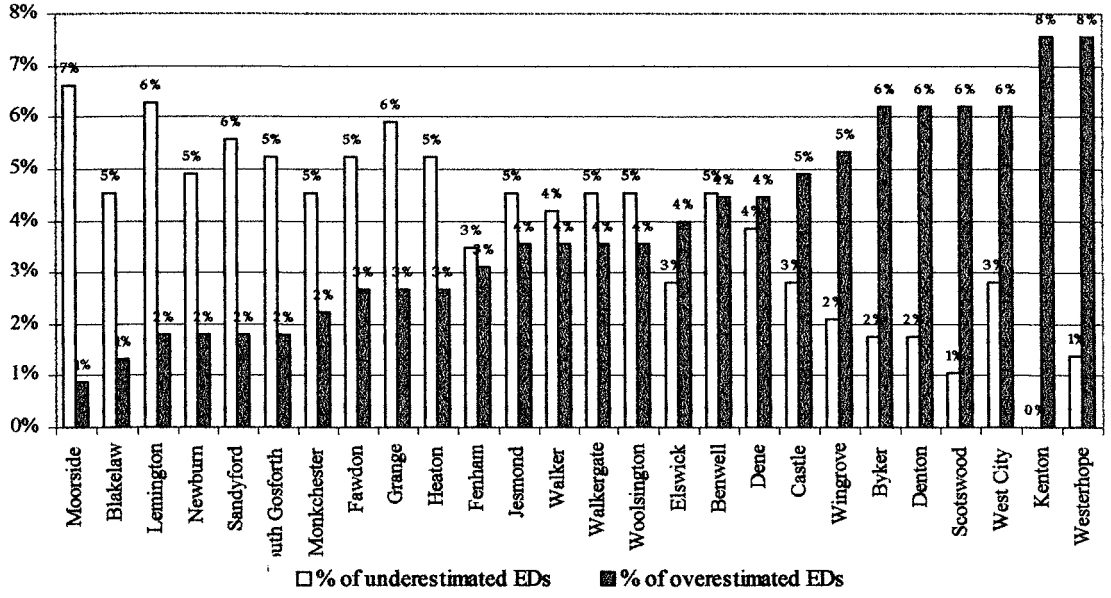


Figure 5.29 Distribution of the excess and shortfall of Census vacancies in the City, in comparison with the dataset figures

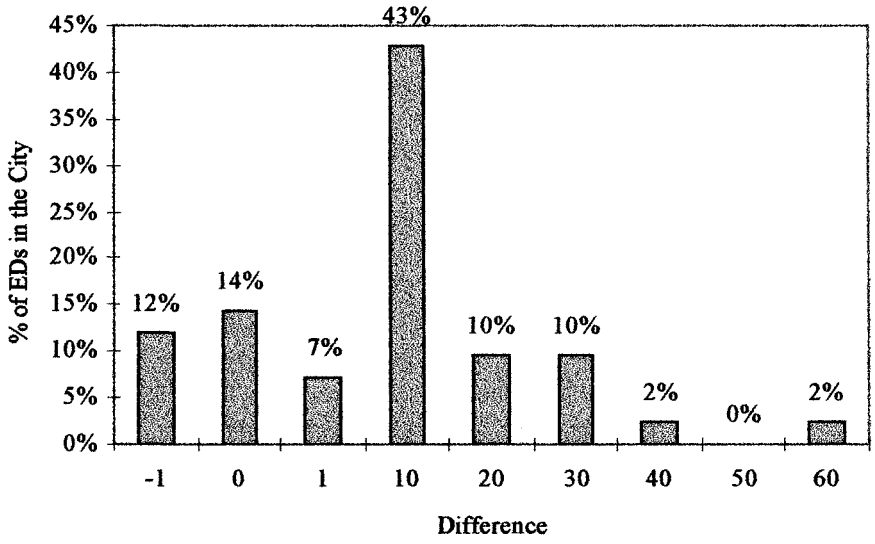


Figure 5.30 Benwell & Scotswood EDs: Differences in vacant residential dwellings: 1991 Census - 1991 Vacant Properties Database

In Benwell and Scotswood, the majority (67%) of EDs included higher vacancy counts Census than the datasets (Figure 5.30). This pattern was particularly apparent in four

EDs in Benwell (CJFU19, CJFU13, CJFU15 and CJFU17) and one ED (CJFA21) in Scotswood (Figure 5.31 and Table 5.17). The ED profile for CJFU13 is investigated in more detail in Chapter 6.

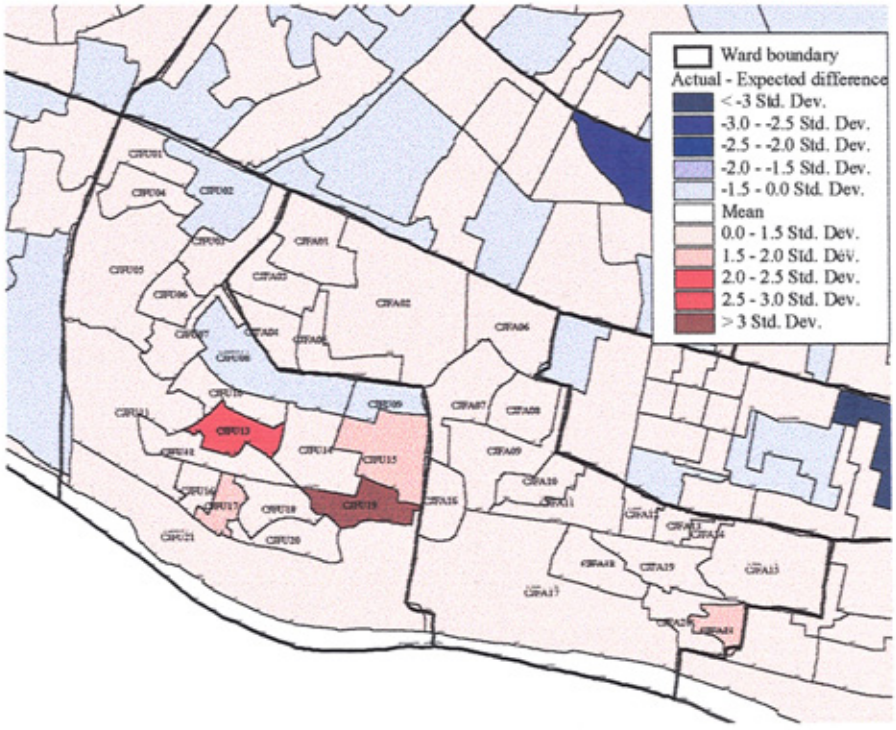


Figure 5.31 Benwell and Scotswood EDs: Distribution of differences in vacant dwelling figures: 1991 Census – 1991 Vacant properties database

Ward	ED code	SAS61-Vacant Accom	Accom not used as main residence – no persons present	Total Census Vacant Accom	1991 Vacant properties database	Census - Datasets	Difference as percentage of Census figures	Expected Difference	Observed – Expected
Scotswood	CJFU08	6	0	6	15	-9	-150.00%	-2	-7
Scotswood	CJFU02	4	0	4	11	-7	-175.00%	-1	-6
Scotswood	CJFU09	1	0	1	4	-3	-300.00%	0	-3
Scotswood	CJFU21	30	0	30	32	-2	-6.67%	-3	1
Scotswood	CJFU10	9	0	9	11	-2	-22.22%	-10	8
Benwell	CJFA08	3	0	3	3	0	0.00%	-2	2
Scotswood	CJFU07	6	0	6	6	0	0.00%	-3	3
Benwell	CJFA02	9	0	9	9	0	0.00%	-1	1
Scotswood	CJFU04	6	0	6	6	0	0.00%	-2	2
Benwell	CJFA06	2	0	2	2	0	0.00%	-1	1
Benwell	CJFA10	3	0	3	3	0	0.00%	-1	1
Scotswood	CJFU05	4	0	4	3	1	25.00%	-2	3
Scotswood	CJFU01	7	0	7	6	1	14.29%	-1	2
Benwell	CJFA19	2	0	2	1	1	50.00%	-1	2
Scotswood	CJFU03	7	3	10	8	2	20.00%	-3	5
Benwell	CJFA11	7	0	7	5	2	28.57%	-2	4
Benwell	CJFA05	5	0	5	3	2	40.00%	-2	4
Benwell	CJFA20	61	0	61	59	2	3.28%	-20	22
Benwell	CJFA01	10	0	10	7	3	30.00%	-3	6
Benwell	CJFA03	10	0	10	7	3	30.00%	-3	6
Benwell	CJFA15	20	0	20	17	3	15.00%	-7	10
Benwell	CJFA21	121	0	121	118	3	2.48%	-39	42
Benwell	CJFA16	26	0	26	21	5	19.23%	-6	11
Benwell	CJFA04	10	0	10	5	5	50.00%	-3	8
Scotswood	CJFU06	19	0	19	14	5	26.32%	-8	13
Benwell	CJFA18	22	0	22	16	6	27.27%	-7	13
Scotswood	CJFU18	75	0	75	68	7	9.33%	-24	31
Benwell	CJFA17	18	0	18	10	8	44.44%	-12	20
Benwell	CJFA09	38	0	38	30	8	21.05%	-6	14
Scotswood	CJFU11	22	0	22	13	9	40.91%	-7	16
Benwell	CJFA14	26	1	27	18	9	33.33%	-9	18
Scotswood	CJFU20	67	0	67	57	10	14.93%	-22	32
Benwell	CJFA13	23	0	23	12	11	47.83%	-8	19
Benwell	CJFA12	36	0	36	23	13	36.11%	-12	25
Scotswood	CJFU14	58	0	58	40	18	31.03%	-19	37
Scotswood	CJFU16	37	0	37	19	18	48.65%	-12	30
Scotswood	CJFU12	28	0	28	7	21	75.00%	-9	30
Benwell	CJFA07	33	0	33	11	22	66.67%	-11	33
Scotswood	CJFU15	56	0	56	30	26	46.43%	-18	44
Scotswood	CJFU17	56	0	56	28	28	50.00%	-18	46
Scotswood	CJFU13	61	0	61	21	40	65.57%	-20	60
Scotswood	CJFU19	66	0	66	6	60	90.91%	-22	82
Benwell & Scotswood		1110	4	1114	785	329	29.53%	-362	691
City-wide totals		6719	155	6874	9116	-2242	-32.62%	-2266	24

Table 5.17 Benwell & Scotswood EDs: Differences in vacant residential dwellings: 1991 Census - 1991 Vacant Properties Database

5.6.3 EDs: all residential dwellings (occupied and vacant)

The Census District figure of residential dwellings (119767) was only slightly (-448) less than that from the Planning Department's 1995 Gazetteer (120215). The greatest Census shortfall in these figures were found in West City, Fenham and Fawdon. The distribution of differences among EDs was similar (Figure 5.32).

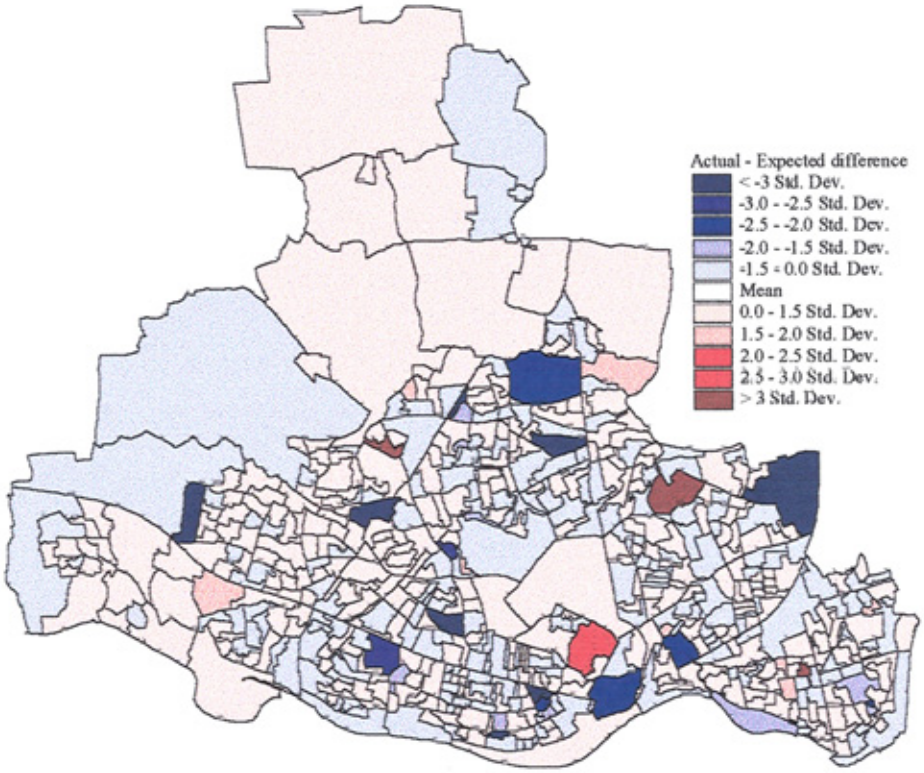


Figure 5.32 EDs: Distribution of differences in total residential dwelling figures: 1991 Census – 1995 Gazetteer

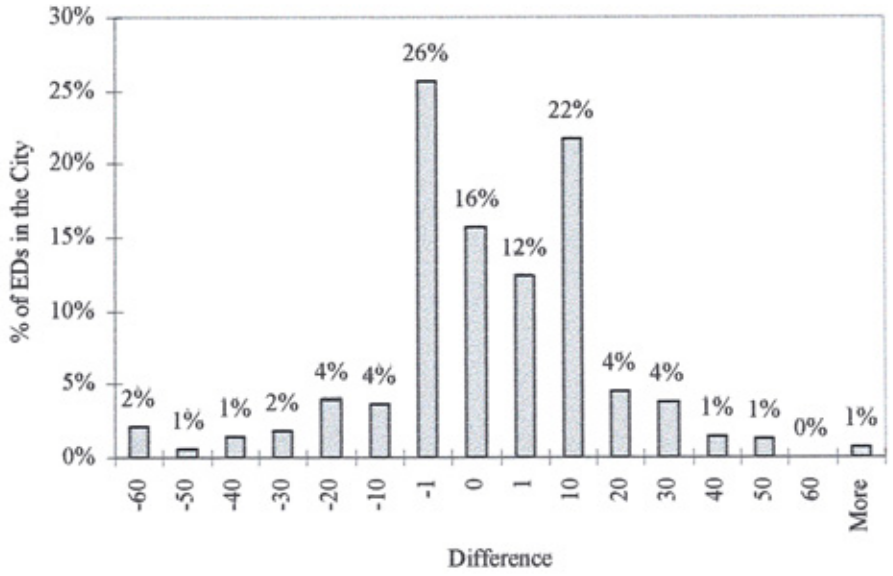


Figure 5.33 All EDs: Difference in residential dwelling figures: 1991 Census - 1995 Gazetteer

It was found that the city-wide pattern of lower Census figures was repeated in 40% of EDs, but only 14% of EDs included differences of 10 or more dwellings between the two figures (Figure 5.33). The opposite pattern of higher Census figures of residential dwellings than those from the gazetteer was found in 45% of EDs. Although West City, Fenham and Fawdon were the Wards with the highest Census shortfalls in residential dwelling figures, the majority of EDs with Census shortfalls were located in Heaton, Byker and Dene. Similar patterns were found in EDs within Benwell, Scotswood, Elswick and West City (Figure 5.34).

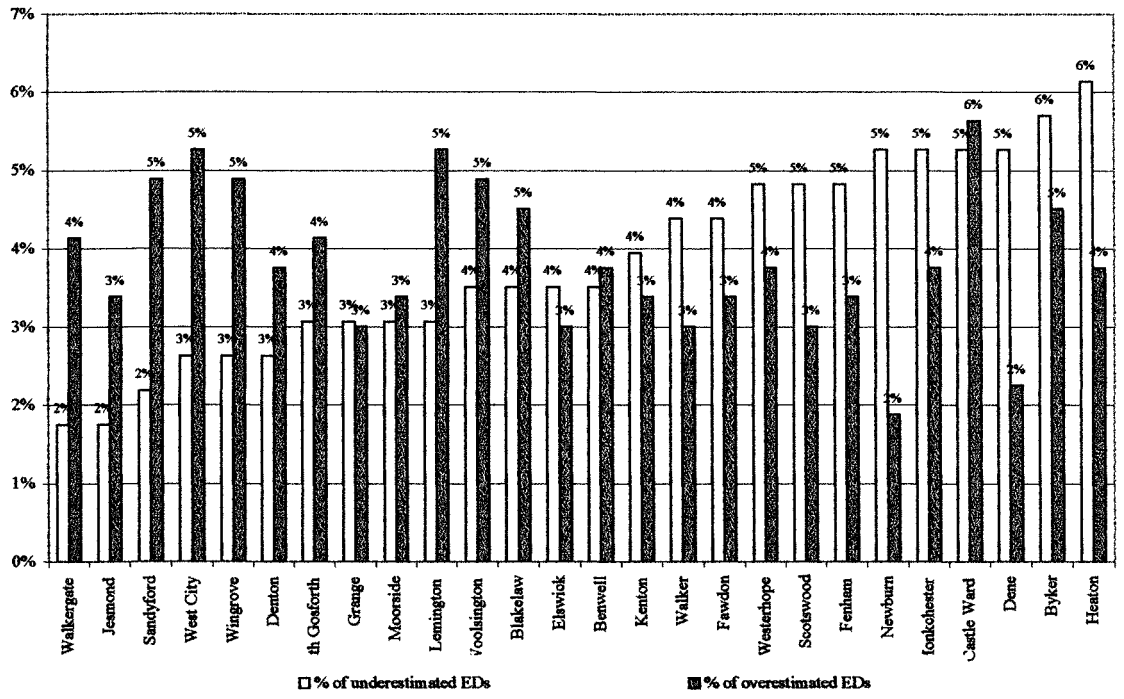


Figure 5.34 Distribution of the excess and shortfall of Census residential dwelling figures, in comparison with the dataset figures, among EDs

The distribution of differences among EDs within Benwell and Scotswood and in the City were similar.The Census figure of residential dwellings in the City was slightly less than the dataset figure, but in almost half (45%) of the EDs in the City and within Benwell and Scotswood the Census recorded more dwellings than the datasets (Figure 5.33 and 5.35).

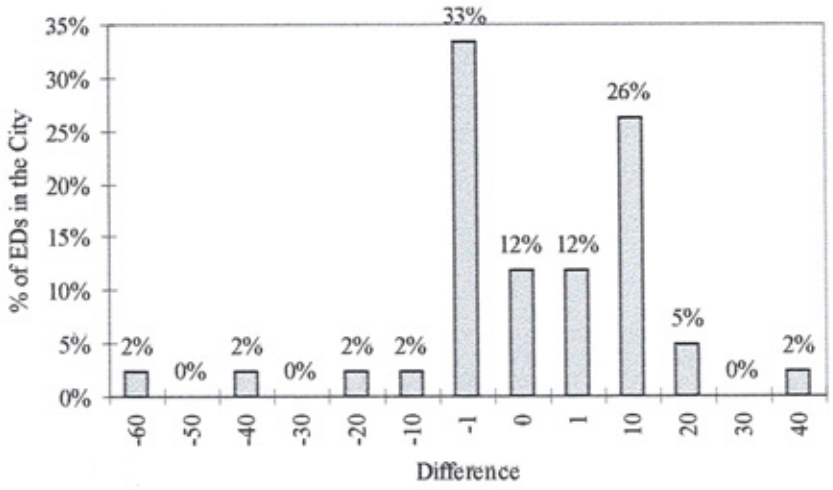


Figure 5.35 Benwell & Scotswood EDs: Differences in total residential dwellings: 1991 Census - 1995 Gazetteer

In Benwell and Scotswood, the differences between the Census and dataset figures of total residential dwellings were similar (-27 and –24). At the ED resolution however, significant differences were found in two EDs within Benwell (CJFA02 and CJFA07) (Figure 5.36 and Table 5.18).

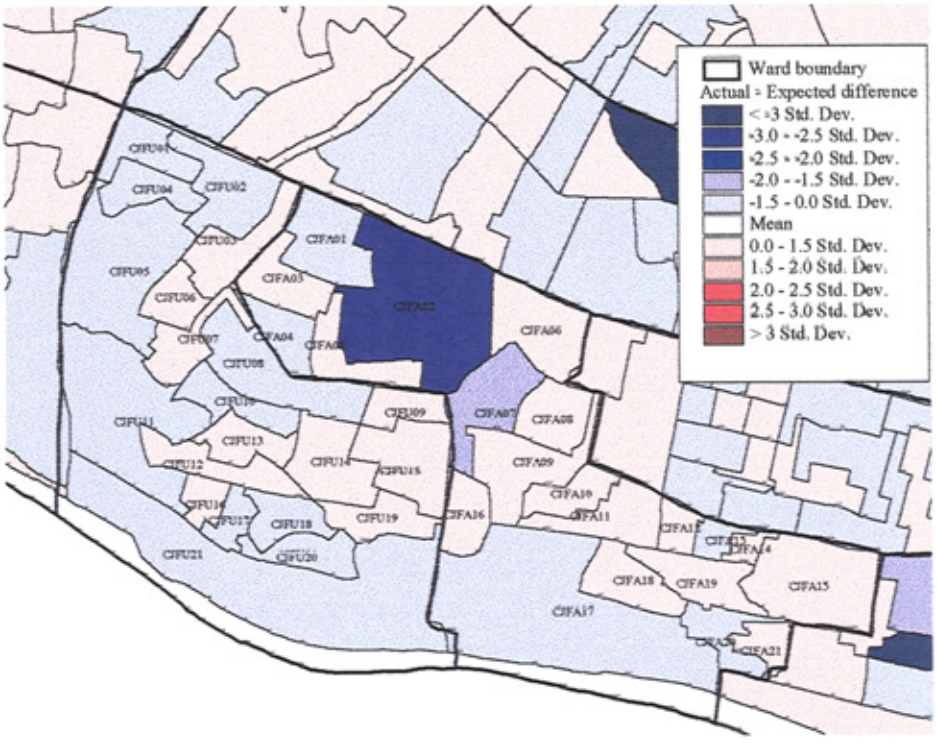


Figure 5.36 Benwell and Scotswood EDs: Distribution of differences in residential dwelling figures: 1991 Census – 1995 Gazetteer

ED Code	SAS61	1995 Gazetteer	Actual difference	% of actual difference	expected average difference	expected - average
CJFA02	194	262	-68	-35.1%	-0.72	-67.28
CJFA07	201	245	-44	-21.9%	-0.74	-43.26
CJFA17	182	206	-24	-13.2%	-0.67	-23.33
CJFU20	182	199	-17	-9.3%	-0.67	-16.33
CJFU21	192	196	-4	-2.1%	-0.71	-3.29
CJFU01	165	168	-3	-1.8%	-0.61	-2.39
CJFU17	194	197	-3	-1.5%	-0.72	-2.28
CJFU02	193	195	-2	-1.0%	-0.71	-1.29
CJFU05	192	194	-2	-1.0%	-0.71	-1.29
CJFA04	203	205	-2	-1.0%	-0.75	-1.25
CJFA20	205	207	-2	-1.0%	-0.76	-1.24
CJFA13	217	219	-2	-0.9%	-0.80	-1.20
CJFU04	206	207	-1	-0.5%	-0.76	-0.24
CJFU10	205	206	-1	-0.5%	-0.76	-0.24
CJFU18	209	210	-1	-0.5%	-0.77	-0.23
CJFU08	212	213	-1	-0.5%	-0.78	-0.22
CJFA01	214	215	-1	-0.5%	-0.79	-0.21
CJFU11	215	216	-1	-0.5%	-0.79	-0.21
CJFU12	201	201	0	0.0%	-0.74	0.74
CJFU13	210	210	0	0.0%	-0.77	0.77
CJFA03	212	212	0	0.0%	-0.78	0.78
CJFA05	211	211	0	0.0%	-0.78	0.78
CJFA09	222	222	0	0.0%	-0.82	0.82
CJFU19	204	203	1	0.5%	-0.75	1.75
CJFA10	205	204	1	0.5%	-0.76	1.76
CJFA21	211	210	1	0.5%	-0.78	1.78
CJFU03	212	211	1	0.5%	-0.78	1.78
CJFU07	212	211	1	0.5%	-0.78	1.78
CJFU09	206	204	2	1.0%	-0.76	2.76
CJFU06	200	197	3	1.5%	-0.74	3.74
CJFA18	206	203	3	1.5%	-0.76	3.76
CJFA12	206	202	4	1.9%	-0.76	4.76
CJFA08	218	214	4	1.8%	-0.80	4.80
CJFU14	219	215	4	1.8%	-0.81	4.81
CJFU15	201	196	5	2.5%	-0.74	5.74
CJFA06	218	212	6	2.8%	-0.80	6.80
CJFA14	205	198	7	3.4%	-0.76	7.76
CJFU16	208	199	9	4.3%	-0.77	9.77
CJFA11	218	209	9	4.1%	-0.80	9.80
CJFA15	210	197	13	6.2%	-0.77	13.77
CJFA19	206	192	14	6.8%	-0.76	14.76
CJFA16	237	202	35	14.8%	-0.87	35.87
Benwell & Scotswood	8639	8695	-56	-35.9%	-31.86	-24.14
City-wide totals	119774	120215	-440	-0.4%	-441.96	1.96

Table 5.18 Benwell & Scotswood EDs: Differences in total residential dwellings: 1991 Census - 1995 Gazetteer

5.6.4 EDs: Distribution of EwC non-response and student adjustments

The distribution of EwC non-response and student adjustments (Figure 5.37 and Figure 5.38) were compared to that of the observed differences, in order to investigate the role of student accommodation in Census non-response. Particularly, as West City Ward was ranked 6th among 25 national Wards with the highest levels of Census non-response (Chapter 2 – Section 2.5.2). It was found that a significant proportion (55%) of the total EwC adjustments in the City were due to non-response. In addition, this was most apparent in Benwell, Scotswood and West City, where the proportion rose to 89%. The distribution patterns suggested that non-response adjustments were higher in those areas where the Census recorded more vacancies and less occupied council stock than the datasets . The correlation values (Section 5.8.5) however, only confirmed the former suggestion, where the excess of Census vacancies and non-response adjustments were found strongly associated at the City scale.

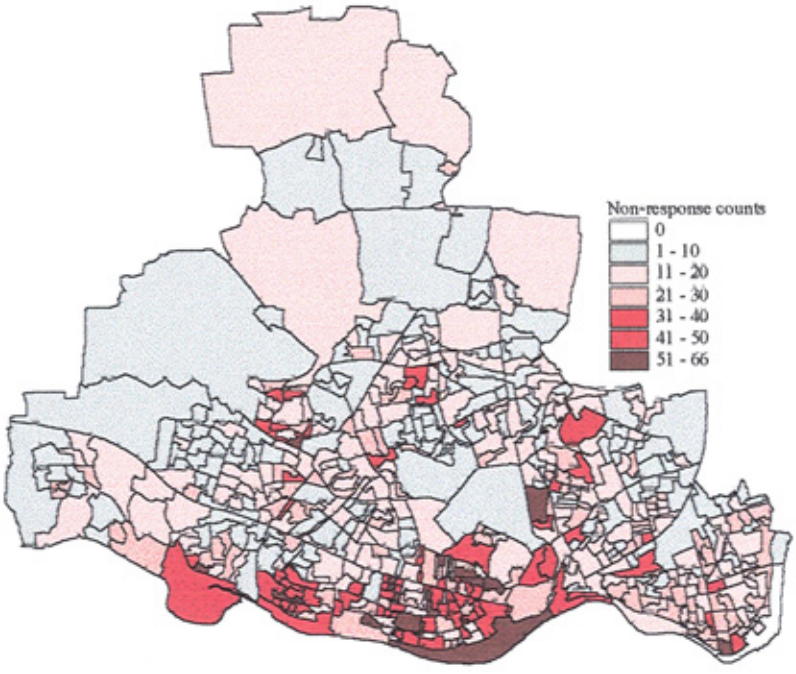


Figure 5.37 Distribution of EwC non-response adjustments among EDs

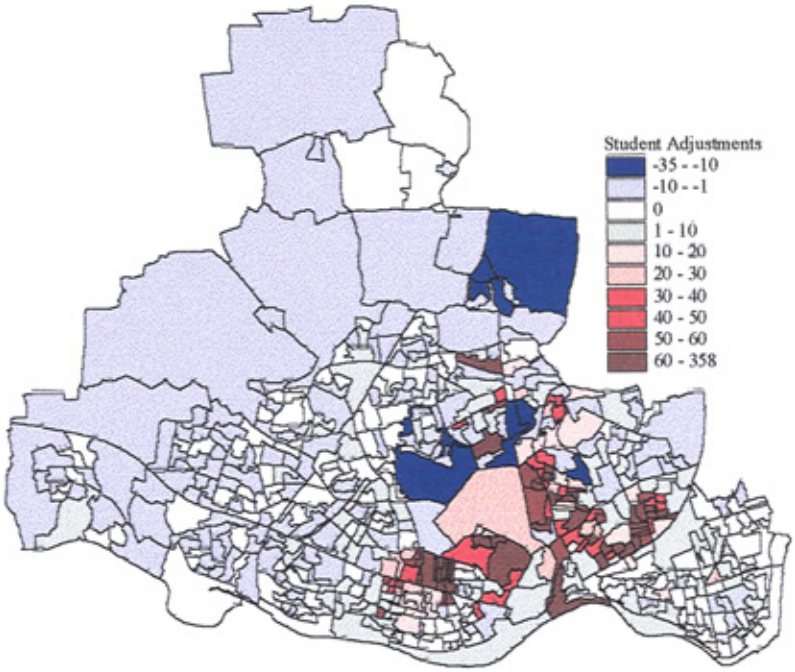


Figure 5.38 Distribution of EwC student adjustments among EDs

The areas with positive student adjustments were those with students' term-time residences, as the EwC project added student figures to their term-time address. These included Newcastle University halls of residence and student accommodation in Arthur's Hill, Chillingham Road (Heaton), parts of Jesmond, parts of Gosforth and South Gosforth. The comparison of the distributions of student and non-response adjustments, suggested that the areas where the students home address was located (with negative student adjustments, such as Fenham) were also those that included higher non-response adjustments. The correlation values (Section 5.8.16) between student and non-response adjustments confirmed strong associations at the City scale and in Benwell and Scotswood.

5.6.5 EDs: Summary

The Census counts of vacancies were higher than the local authority figures in most (67%) EDs within Benwell and Scotswood. The Census excess of vacancies and shortfall of occupied council stock were similar in CJFU19 and CJFU13, suggesting possible miss-classification errors. These were also the highest differences in the City (Table 5.19). The Census and dataset Ward figures of total residential dwellings were similar and significant lower Census figures were only found in 2 EDs (CJFA07, CJFA02).

	EwC Adjustments							Differences in:		
ED	Students	Timing	Data Modific-ation	Armed Forces	Residual non-response	Total adjustm-ents	% of Residual non-response	Occupied council stock	Vacancies	residential dwellings
CJFU19	-2	0	1	0	19	18	105.6%	-57	60	1
CJFU13	-1	0	1	0	47	47	100.0%	-43	40	0
CJFU17	-1	0	1	0	36	36	100.0%	3	28	-3
CJFU15	1	0	1	0	25	27	92.6%	6	26	5
CJFA07	3	0	1	0	20	24	83.3%	**-1**	**22**	**-44**
CJFU12	0	0	1	0	55	56	98.2%	-18	21	0
CJFU14	0	0	1	0	50	51	98.0%	-16	18	4
CJFU16	6	0	1	0	38	45	84.4%	7	18	9
CJFA12	55	0	1	0	48	104	46.2%	2	13	4
CJFA13	9	0	1	0	32	42	76.2%	19	11	-2
CJFU20	0	0	1	0	29	30	96.7%	**-13**	**10**	**-17**
CJFA14	0	0	1	0	47	48	97.9%	-3	9	7
CJFU11	0	0	1	0	42	43	97.7%	-15	9	-1
CJFA09	1	0	1	0	41	43	95.3%	-2	8	0
CJFA17	4	0	1	0	28	33	84.8%	**-15**	**8**	**-24**
CJFU18	0	0	1	0	39	40	97.5%	-8	7	-1
CJFA18	9	0	1	0	63	73	86.3%	10	6	3
CJFU06	0	0	1	0	12	13	92.3%	-2	5	2
CJFA16	7	0	2	0	47	56	83.9%	-12	5	35
CJFA04	0	0	2	0	8	10	80.0%	-3	5	-2
CJFA03	-3	0	2	0	7	6	116.7%	0	3	0
CJFA01	-2	0	2	0	5	5	100.0%	0	3	-1
CJFA21	0	0	1	0	32	33	97.0%	30	3	1
CJFA15	12	0	2	0	57	71	80.3%	10	3	13
CJFA05	-6	0	2	0	13	9	144.4%	4	2	0
CJFA20	0	0	1	0	20	21	95.2%	23	2	-2
CJFA11	8	0	2	0	30	40	75.0%	3	2	9
CJFU03	1	0	2	0	6	9	66.7%	-4	2	1
CJFU01	-3	0	1	0	5	3	166.7%	0	1	-3
CJFU05	-1	0	1	0	9	9	100.0%	-3	1	-2
CJFA19	3	0	1	0	19	23	82.6%	10	1	14
CJFA02	-4	0	2	0	13	11	118.2%	**-2**	**0**	**-68**
CJFU07	-1	0	2	0	35	36	97.2%	-6	0	1
CJFA08	0	0	2	0	47	49	95.9%	-16	0	4
CJFA06	0	-1	2	0	20	21	95.2%	5	0	6
CJFA10	0	0	2	0	12	14	85.7%	5	0	1
CJFU04	-1	0	2	0	5	6	83.3%	0	0	-1
CJFU10	-2	0	2	0	33	33	100.0%	-3	-2	0
CJFU21	0	0	2	0	31	33	93.9%	-9	-2	-4
CJFU09	0	0	2	0	12	14	85.7%	4	-3	2
CJFU02	1	0	2	0	26	29	89.7%	-2	-7	-2
CJFU08	0	0	2	0	32	34	94.1%	-6	-9	-1
Total	93	-1	61	0	1195	1348	88.6%	-118	329	-56
City totals	7984	-63	962	0	10744	19627	54.7%	231	-2242	-448

Table 5.19 Benwell and Scotswood EDs: EwC adjustment figures and differences in vacancies, occupied local authority stock and total residential dwellings

5.7 Summary

Census excess of vacancies (actual minus expected) in Benwell and Scotswood were the highest in the City (Table 5.20) and thus selected for detailed ED analysis. Census counts of residential dwellings were lower than the dataset figures in both Wards. The Census occupied council stock figures were also less than the dataset figures in Scotswood but more than the dataset figures in Benwell. Significant differences were found in Benwell, Blakelaw, Walker and Cruddas Park (Housing Areas), in Fawdon, Pottery Bank, Scotswood, Avison Street and Cruddas Park (Housing Neighbourhoods) and Fawdon, Scotswood, Moorside, Dene, Grange and West City (Wards).

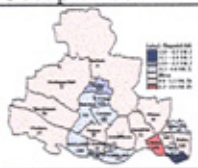
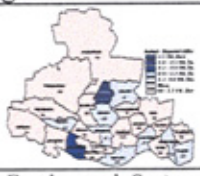
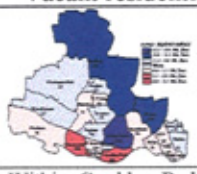
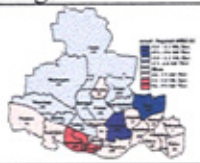
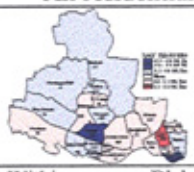
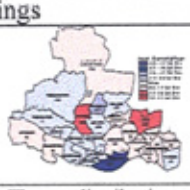
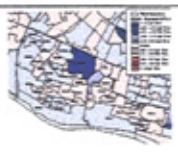
District	Area	Neighbourhood	Ward	ED
		Occupied council housing stock		
Census 0.5%>Data				
Census figure was 0.5% more than the dataset figure	Benwell, Blakelaw, and Walker were noted for lower Census figures. Cruddas Park was noted for the excess of Census occupied council stock.	Within Blakelaw, Fawdon was the Neighbourhood with the greatest shortfall of Census figures Within Walker, Pottery Bank had the most Census shortfall	Fawdon and Scotswood were noted because of the lower occupied stock figures.	Within Benwell and Scotswood, CJFU19, CJFU13 were noted as the EDs with the largest Census shortfalls
		Vacant residential dwellings		
Census 33%<Data				
Census vacancy figure was 33% less than the dataset figure	The opposite pattern of Census excess of vacancies was noted in **Benwell**. Census shortfall of vacancies was noted in **Cruddas Park** and **Blakelaw**	Within Cruddas Park, the Census shortfall was more apparent in **Avison Street.** Within Benwell and Cruddas Park, **Scotswood** and **Cruddas Park** Neighbourhoods had unexpectedly higher Census vacancy figures.	In **Moorside**, **Dene** and **Grange,** Census recorded fewer vacancies. The opposite pattern was found in **Benwell** and **Scotswood**.	Within Benwell and Scotswood, Census vacancy figures were unexpectedly high in 5 EDs: CJFU19, CJFU13, CJFU15, CJFU17 and CJFA21
		All residential dwellings		
Census 0.4%<Data				
Census figure was 0.4% less than the dataset figures	This was particularly apparent in **Blakelaw** and **Benwell**	Within Blakelaw:, **Fenham** was the Neighbourhood with the most difference. The Census counts were significantly less than the dataset counts	The distribution of differences among Wards highlighted **Dene** and **Blakelaw** with more Census counts and **Fawdon** and **West City** with less Census counts than the datasets..	The Census total residential dwelling figures were unexpectedly low in 2 EDs within Benwell: CJFA02 CJFA07

Table 5.20 Summary

According to the Census Validation Survey in 1993, some dwellings were counted and allocated to neighbouring EDs and some may have been counted as part of two or more EDs. Census underenumeration has also been reported to be concentrated in those Neighbourhoods with a large proportion of sub-divided properties (Dorling 1993). Evidence of these suggestions was sought in Benwell and Scotswood, using the correlation analysis and the individual property records that follows.

5.8 Relationships between variables

Correlation analysis was carried out in order to highlight the characteristics of the areas with significant differences. This information was used to help explain differences using the individual property records (Chapter 6). The correlation analysis investigated associations between the observed differences and six variables. These were selected on the basis of information obtained from the reviewed literature (detailed below). Differences in vacancies (Dv), occupied council properties (D_o) and residential dwellings (D_r) were correlated with dwelling structure (from table SAS61), tenure (from table SAS62), communal establishments (from table SAS03), Census imputed residents (from table SAS01) residual non-response adjustment figures (from the EwC project) and accommodation not used as main residence. The EwC adjustments and imputed residents were also correlated with area characteristics (dwelling structure, tenure, communal establishments and accommodation not used as main residence), in order that comparisons could be made between the characteristics of the areas with significant differences and those of areas prone to Census underenumeration.

Dwelling tenure, structure and the number of communal establishments were included in the correlation analysis to test some of the national reasons for the Census underenumeration (such as failure to identify all household spaces in multi-occupied accommodation, mentioned in Chapter 2 – Section 2.4.1) at the local scale. Imputed residents were included in the analysis because they were one of the indicators of residual non-response, used in the EwC project. The inclusion of accommodation not used as main residence in the analysis, which included student accommodation, was because of the possibility that vacant properties of this type may have contributed to Census underenumeration. This was highlighted as part of the EwC discussions (Chapter 2 - Section 2.5.2). EwC adjustment figures were also correlated with the

observed differences in order to establish possible associations with the observed differences. The associations between imputed residents and the selected variables were also investigated. Similarities were then drawn between these and the associations with D_v, D_o and D_r (Table 5.21). The correlation analysis was carried out at two scales with the same resolution: for a) all the EDs within the city and b) the EDs within Benwell and Scotswood Wards only. These Wards were selected because of their patterns of vacancy differences (Section 5.5.2), which were in contrast to the city-wide pattern. The Census vacancy figures in these Wards were higher (more than 1.4 standard deviations) than the dataset vacancy figures in other Wards in the City. The two part investigation was carried out at two different scales with the same resolution (EDs). This distinguished the associations, which were significant in Benwell and Scotswood from those at the city-wide scale. Correlation values that were found significant at the City scale but not in Benwell and Scotswood, suggested either weaker associations (as was often the case) or no associations in these Wards. Conversely, correlation values that were found to be significant in Benwell and Scotswood and not at the City scale, suggested that associations in these Wards were masked at the City scale.

	Structure	Tenure	Imputed residents	Communal Establishments	EwC adjustments	Accommodation not used as main residence
Dv, Do, Dr	✓(5.8.1)	✓(5.8.2)	✓(5.8.3)	✓(5.8.4)	✓(5.8.5)	✓(5.8.6)
EwC adjustments	✓(5.8.7)	✓(5.8.8)	✓(5.8.14)	✓(5.8.9)	N/A	✓(5.8.10)
Imputed residents	✓(5.8.11)	✓(5.8.12)	N/A	✓(5.8.13)	✓(5.8.14)	✓(5.8.15)

Table 5.21 Relationship between variables (Section numbers in brackets)

Normal distributions, required for parametric Pearson's Correlation were not found in the datasets. Spearman's Rank Correlation was therefore used instead in order to highlight any associations. The null hypothesis was that there were no associations between variables. Correlation coefficients (Table 5.22) greater than the critical value, at 95% confidence interval ($p<0.05$) rejected the null hypothesis. Significant associations were then tested using individual property records.

	Confidence level				
d.f.	95% ($p<0.05$)	97.5% ($p<0.025$)	99% ($p<0.01$)	99.5% ($p<0.005$)	99.95% ($p<0.0005$)
40	0.264	0.313	0.368	0.405	0.479
42	0.257	0.304	0.358	0.393	0.490
100	0.164	0.195	0.230	0.254	0.321

Table 5.22 Critical values for Spearman's rank correlation coefficients

5.8.1 Relationships between D_v, D_o, D_r and dwelling structure

There were more significant associations found in Benwell and Scotswood than at the city-wide scale, particularly between the Census excess of vacancies and different types of flats. This illustrated the differences in correlation values at the two scales and how some significant associations can be masked at the city-wide scale. A significant positive association was found between D_v and the number of flats in residential buildings at the city-wide scale and the number of flats in commercial buildings in Benwell and Scotswood. This suggested that Census excess of vacancies was more in EDs with higher numbers of flats (Table 5.23). The ED profile investigations (Chapter 6 - Section 6.3) found evidence of this in 14 (33%) of the total EDs within Benwell and Scotswood. Negative association was found between Dv and detached and semi-detached houses at both scales. Differences in occupied council stock were not correlated with any type of dwelling structure at the city-wide scale but exhibited a negative association with semi-detached and terraced houses in Benwell and Scotswood. This suggested that Census shortfalls of occupied council stock were more in areas of these Wards with higher numbers of semi-detached and terraced houses. Both D_o and D_r positively correlated with flats in residential buildings, suggesting that in these Wards, the Census counted more occupied council stock and total residential dwellings in EDs where there were more flats.

a)

	SAS61									
	0003	0004	0005	0006	0007	0008	0009	0010	0011	0012
	Detached	Semi Detached	Terraced	Flat in res. building	Flat in com. building	Converted flat	Converted flatlet	Not self-contained flat	Not self-contained 'rooms'	Bedsit
Dv	**-0.231*** **	**-0.186***	0.118	**0.166***	-0.036	-0.063	0.01	0.063	-	-0.063
Do	0.049	0.046	-0.018	-0.001	0.111	0.062	0.033	-0.068	-	-0.028
Dr	0.034	0.004	0.065	0.03	0.007	0.106	0.079	0.104	-	0.063

b)

	SAS61									
	0003	0004	0005	0006	0007	0008	0009	0010	0011	0012
	Detached	Semi Detached	Terraced	Flat in res. building	Flat in com. building	Converted flat	Converted flatlet	Not self-contained flat	Not self-contained 'rooms'	Bedsit
Dv	-0.098	**-0.356****	0.188	0.227	**0.312****	**0.294***	**0.258***	-	-	-
Do	-0.18	**-0.259***	**-0.371*****	**0.582******	0.144	-0.091	-0.027	-	-	-
Dr	-0.193	-0.24	-0.003	**0.456******	0.036	0.164	0.109	-	-	-

Table 5.23 Correlation between D_v, D_o, D_r and structure of all dwellings in a) all EDs in the City and b) in EDs within Benwell and Scotswood - zero values; 99.95% *****; 99.5% ****; 99% ***; 97.5% **; 95% *.

5.8.2 Relationship between D_v, D_o, D_r and dwelling tenure

Significant positive association was found between D_v and local authority rented dwellings at the city-wide scale and with privately rented dwellings in Benwell and Scotswood (Table 5.24). The ED profile investigations found evidence of this in 18 (43%) of the total EDs within these Wards (Chapter 6 - Section 6.3). The negative association between D_o and local authority rented dwellings in Benwell and Scotswood suggested that the Census shortfall of occupied council stock occurred more with increasing numbers of local authority rented dwellings.

a)

	SAS62						
	0002	*0003*	*0004*	*0005*	*0006*	*0007*	*0008*
	Owned outright	Buying	Rented privately: Furnished	Rented privately: Un-furnished	Rented with a job or business	Rented from a housing association	Rented from a local authority or new town
Dv	**-0.318******	**-0.318******	-0.032	0.027	-0.077	0.135	**0.281******
Do	**0.174***	**0.166***	**0.177***	**0.244*****	-0.053	0.109	-0.159
Dr	0.037	0.086	0.072	0.065	0.05	0.087	0.015

b)

	SAS62						
	0002	*0003*	*0004*	*0005*	*0006*	*0007*	*0008*
	Owned outright	Buying	Rented privately: Furnished	Rented privately: Un-furnished	Rented with a job or business	Rented from a housing association	Rented from a local authority or new town
Dv	-0.207	-0.193	**0.350 ****	**0.264 ***	-0.231	0.007	-0.062
Do	0.145	-0.008	0.067	**0.434******	-0.137	**0.318****	**-0.263***
Dr	-0.148	-0.137	0.186	0.187	0.014	0.275*	0.139

Table 5.24 Correlation between D_v, D_o, D_r and tenure of all dwellings in a) all EDs in the City and b) in EDs within Benwell and Scotswood, 99.95% *****; 99.5% ****; 99% ***; 97.5% **; 95% *.

5.8.3 Relationship between D_v, D_o, D_r and imputed residents

There were no significant associations between the observed differences and the number of imputed residents at the city-wide scale or in Benwell and Scotswood (Table 5.25). The association between imputed residents and dwelling structure, tenure, communal establishments and residual non-response adjustment figures were investigated in order to highlight the characteristics shared by the EDs with high differences (D_v, D_o and D_r) and those with high numbers of imputed residents.

	Imputed residents – S10022	
Differences	*a) City*	*b)Benwell and Scotswood*
Dv	0.066	0.056
Do	0.012	0.012
Dr	0.010	0.227

Table 5.25 Relationship between D_v, D_o, D_r and imputed residents

5.8.4 Relationships between D_v, D_o, D_r and communal establishments

There were no significant positive associations at the city-wide scale or in Benwell and Scotswood (Table 5.26). Negative associations however, were found between D_v and local authority homes. This suggested that the Census found fewer vacancies than the local authority datasets in EDs with higher numbers of local authority homes. Negative associations were also found between D_r and private nursing homes and educational establishments. This suggested Census excess of residential dwelling counts in these Wards, which had fewer numbers of educational establishments (such as halls of residence).

		a) City wide			b) Benwell and Scotswood		
Cell No	SAS03 variable	Dv	Do	Dr	Dv	Do	Dr
0001	*All establishments*	*-0.083*	*0.04*	*-0.005*	*-0.351***	*-0.048*	*-0.239*
0011	*Medical & Care Sector*	*-0.083*	*0.056*	*-0.027*	*-0.402*	*-0.158*	*-0.360***
0031	NHS hosp./homes - other	-0.066	-0.027	-0.06	-	-	-
0051	Non-NHS hospitals - other	-0.031	0.048	0.015	-	-	-
0061	**Local authority homes**	-0.055	0.014	0.018	**-0.476******	-0.163	-0.226
0071	Housing association homes and hostels	0.037	0.043	-0.022	-	-	-
0081	**Nursing homes – Non-NHS/LA/HA**	-0.027	-0.023	0.013	-0.13	-0.075	**-0.283***
0091	Residential homes - Non-NHS/LA/HA	-0.090	0.092	-0.052	0.033	0.007	-0.095
0101	Children's homes	-0.022	0.046	0.087	-	-	-
0111	*Detention, defence, and education*	*-0.116*	*0.016*	*-0.065*	*-0.13*	*-0.075*	*-0.283**
0141	**Educational**	-0.116	0.016	-0.065	-0.13	-0.075	**-0.283***
0151	*Other groups*	*-0.04*	*0.022*	*0.033*	*0.033*	*0.22*	*0.223*
0161	Hotels, boarding houses, etc	-0.044	0.057	-0.033	0.033	0.22	0.223
0171	Hostels & common lodging houses (Non-HA)	0.046	-0.064	0.104	-	-	-
0181	Other	-0.11	0.031	-0.008	-	-	-

Table 5.26 Relationship between D_v, D_o, D_r and the number of communal establishments in a) all EDs in the City and b) in EDs within Benwell and Scotswood

5.8.5 Relationships between D_v, D_o, D_r and EwC adjustments

There was a positive association between D_v and residual non-response adjustments at the city-wide scale, suggesting that Census non-response was more in EDs with more Census excess of vacancies (Table 5.27). In Benwell and Scotswood the positive

association between D_o and D_r with student adjustments suggested that student adjustments increased in EDs where the Census recorded more occupied council stock than the local authority datasets. Also in these Wards, positive association was found between D_r and student and non-response adjustments. This suggested Census shortfall of residential dwellings was more in these Wards, which had higher numbers of students at their home address (higher negative student adjustments).

a)

	EwC Adjustments					
Differences	Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments
Dv	0.083	-0.024	-0.096	-	**0.275******	**0.192***
Do	0.097	-0.090	0.160	-	-0.038	0.031
Dr	0.040	-0.031	0.057	-	0.029	0.043

b)

	EwC Adjustments					
Differences	Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments
Dv	0.214	0.130	**-0.675*******	-	0.208	0.231
Do	**0.274***	-0.186	-0.024	-	-0.065	-0.035
Dr	**0.405******	-0.191	0.056	-	0.263*	**0.315***

Table 5.27 Correlation coefficients between D_v, D_o, D_r and EwC adjustment figures in a) all EDs in the City and b) in EDs within Benwell and Scotswood

5.8.6 Relationships between D_v, D_o, D_r and accommodation not used as main residence

There were no associations at the city-wide scale but in Benwell and Scotswood, Census overestimation of vacancies, occupied council stock and total residential dwellings were positively correlated with the number of dwellings occupied by visitors (persons enumerated but no residents), which included students (Table 5.28). This was investigated because accommodation not used as main residence included student accommodation. The correlation figures were examined to see whether the overestimation of vacancies by the Census was linked to large numbers of visitors recorded by the enumerators.

Accommodation not used as main residence (full description in Chapter 3, Section 3.2.1), comprised vacant (no persons present) and occupied (persons present but no residents) accommodation. Those vacant, were categorised under three groups: student

accommodation (houses and flats and not halls of residence), holiday accommodation and second residences. Occupied accommodation of this type, included students present in term-time address on Census night. The Census considered students as visitors in their term-time address. Vacant accommodation not used as main residence were added to the total count of Census vacancies and compared to an equivalent figure from the local authority's 1991 vacant properties database. Accommodation not used as main residence included student accommodation, which contributed to the associations with the observed differences.

a)

	SAS62	Observed differences				EwC Adjustment figures					SAS01
SAS61	Variable	Dv	Do	Dr	Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments	Imputed residents
0043	Accommodation not used as main residence	-0.021	0.145	0.069	**0.667*****	-0.061	0.059	-	0.163	**0.541*****	**0.283****
0057	No persons present	-0.057	0.053	0.023	**0.175***	0.011	-0.091	-	-0.016	0.131	0.112
0071	Persons enumerated but no residents	-0.017	0.148	0.062	**0.675*****	-0.078	0.072	-	**0.180***	**0.558*****	**0.269****

b)

	SAS62	Observed differences				EwC Adjustment figures					SAS01
S61		Dv	Do	Dr	Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments	Imputed residents
0043	Accommodation not used as main residence	**0.316****	0.219	**0.356****	**0.539*****	0.111	-0.037	-	0.191	0.251	0.204
0057	No persons present	0.076	-0.141	0.176	0.085	0.035	0.035	-	-0.129	-0.085	-0.081
0071	Persons enumerated but no residents	**0.299***	**0.268***	**0.281***	**0.524*****	0.106	-0.022	-	0.159	0.214	0.170

Table 5.28 Correlation coefficients between D_v, D_o, D_r and number of second residences in a) all EDs in the City and b) in EDs within Benwell and Scotswood

In addition to the above, correlations with imputed residents, EwC adjustment figures and the number of accommodation not used as main residence were also carried out and the similarities were noted.

5.8.7 Relationship between EwC adjustments and dwelling structure

The EwC non-response adjustments at the city-wide scale were positively associated with the number of terraced houses and flats (Table 5.29). These were flats in residential accommodation and converted flats or flatlets. Student adjustments were also more in areas with higher numbers of flats, including those in commercial buildings. In Benwell

and Scotswood, similar associations were found. Non response adjustments were more in areas with higher numbers of flats in commercial buildings and converted flats. Positive associations were also found between student adjustments and flats in residential/commercial buildings and converted flats.

a)

	SAS61								
	0003	0004	0005	0006	0007	0008	0009	0010	0012
	Detached	Semi Detached	Terraced	Flat in res. building	Flat in com. building	Converted flat	Converted flatlet	Not self-contained flat	Bedsit
Students	**-0.425*******	**-0.465*******	0.131	**0.329*******	**0.222****	**0.321*******	**0.275******	0.097	0.064
Census day to mid-year timing	0.083	0.032	-0.033	-0.022	0.010	-0.064	-0.049	-0.026	0.014
Data modification	0.137	**0.210****	0.140	-0.136	0.050	0.063	0.025	-0.045	-0.053
Armed forces	-	-	-	-	-	-	-	-	-
Residual non-response	**-0.361*******	**-0.440*******	**0.246*****	**0.319******	0.098	**0.212****	**0.172***	0.066	-0.068
Total adjustments	**-0.478*******	**-0.563*******	**0.264******	**0.360*******	**0.201****	**0.378*******	**0.323*******	0.083	0.059

b)

	SAS61								
	0003	0004	0005	0006	0007	0008	0009	0010	0012
	Detached	Semi Detached	Terraced	Flat in res. building	Flat in com. building	Converted flat	Converted flatlet	Not self-contained flat	Bedsit
Students	-0.078	**-0.495*******	0.101	**0.600*******	**0.461******	**0.278***	0.233	-	-
Census day to mid-year timing	-0.084	0.016	-0.215	0.111	0.147	**-0.279***	0.035	-	-
Data modification	0.235	**0.510*******	-0.202	-0.247	-0.235	**-0.261***	-0.203	-	-
Armed forces	-	-	-	-	-	-	-	-	-
Residual non-response	-0.239	**-0.623*******	**0.559*******	0.205	**0.312***	**0.352****	0.213	-	-
Total adjustments	**-0.257***	**-0.654*******	**0.515*******	**0.271***	**0.346****	**0.377*****	**0.265***	-	-

Table 5.29 Correlation between EwC adjustments and structure of all dwellings in a) all EDs in the City and b) in EDs within Benwell and Scotswood, 99.95% *****; 99.5% ****; 99% ***; 97.5% **; 95% *.

5.8.8 Relationship between EwC adjustments and dwelling tenure

The associations between EwC adjustments and dwelling tenure, were similar at both city-wide scale and in Benwell and Scotswood, but weaker associations were present in these Wards (Table 5.30). Non response adjustments were strongly associated with the number of dwellings rented from housing associations or the local authority. Student

adjustments were strongly associated with privately rented dwellings and those rented from housing associations.

a)

	SAS62						
	0002	0003	0004	0005	0006	0007	0008
	Owned outright	Buying	Rented privately: Furnished	Rented privately: Un-furnished	Rented with a job or business	Rented from a housing association	Rented from a local authority or new town
Students	**-0.177***	**-0.195****	**0.557*****	**0.397*****	-0.036	**0.307*****	-0.042
Census day to mid-year timing	0.003	0.053	0.014	0.018	-0.007	-0.081	-0.037
Data modification	**0.247*****	**0.284*****	0.087	0.095	0.074	-0.033	-0.012
Armed forces	-	-	-	-	-	-	-
Residual non-response	**-0.509*****	**-0.520*****	0.065	0.007	0.096	**0.412*****	**0.411*****
Total adjustments	**-0.378*****	**-0.396*****	**0.415*****	**0.265*****	0.012	**0.444*****	**0.175***

b)

	SAS62						
	0002	0003	0004	0005	0006	0007	0008
	Owned outright	Buying	Rented privately: Furnished	Rented privately: Un-furnished	Rented with a job or business	Rented from a housing association	Rented from a local authority or new town
Students	**-0.257***	-0.224	**0.558*****	**0.415*****	0.051	**0.359****	0.237
Census day to mid-year timing	0.021	0.022	0.229	0.246	-0.264	0.081	-0.202
Data modification	**0.400*****	**0.462*****	-0.224	-0.153	**0.319****	-0.162	-0.117
Armed forces	-	-	-	-	-	-	-
Residual non-response	**-0.677*****	**-0.707*****	0.245	-0.136	-0.069	**0.321****	**0.643*****
Total adjustments	**-0.665*****	**-0.687*****	**0.316****	-0.058	-0.066	**0.340****	**0.622*****

Table 5.30 Correlation between EwC adjustments and tenure of all dwellings in a) all EDs in the City and b) in EDs within Benwell and Scotswood, 99.95% *****; 99.5% ****; 99% ***; 97.5% **; 95% *.

5.8.9 Relationship between EwC adjustments and Communal Establishments

At the city-wide scale there were no associations between non-response adjustments and the number of communal establishments (Table 5.31). There was however a positive association between student adjustments and the number of hotels and boarding houses. In Benwell and Scotswood, there were negative associations between student adjustments and educational establishments and between non response and residential homes. This suggested that there were more students at their home address (negative student adjustments) in these Wards, which had fewer educational establishments. Non-response was also high despite the fewer numbers of residential homes.

a)

		a) City wide					
Cell No	SAS03 variable	Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments
0001	*All establishments*	*0.104*	*-0.061*	*0.156*	-	*0.111*	*0.162*
0011	*Medical & Care Sector*	*0.045*	*-0.038*	***0.203****	-	*0.068*	*0.098*
0031	NHS hosp./homes - other	0.050	0.027	0.059	-	0.009	0.025
0051	Non-NHS hospitals - other	0.034	0.014	0.083	-	0.015	0.018
0061	Local authority homes	-0.018	0.046	0.121	-	0.078	0.051
0071	H.A. homes and hostels	0.056	-0.002	0.033	-	0.026	0.111
0081	Nursing homes – Non-NHS/LA/HA	0.028	0.007	0.056	-	0.020	0.040
0091	**Residential homes - Non-NHS/LA/HA**	0.109	-0.039	**0.168***	-	0.016	0.075
0101	Children's homes	-0.066	-0.095	0.073	-	-0.024	-0.026
0111	*Detention, defence, and education*	*0.105*	*0.036*	*0.015*	-	*-0.020*	*0.084*
0141	Educational	0.105	0.036	0.015	-	-0.020	0.084
0151	*Other groups*	*0.159*	*-0.080*	*0.034*	-	*0.122*	***0.182****
0161	**Hotels, boarding houses, etc**	**0.176***	-0.076	0.015	-	0.102	**0.190***
0171	Hostels & common lodging houses (Non-HA)	0.057	-0.006	-0.062	-	0.085	0.065
0181	Other	-0.021	0.003	0.092	-	0.038	0.013

b)

		b) Benwell and Scotswood					
Cell No	SAS03 variable	Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments
0001	*All establishments*	*-0.083*	*0.057*	***0.403*********	-	*-0.066*	*-0.085*
0011	*Medical & Care Sector*	*-0.186*	*0.051*	***0.356*****	-	*-0.145*	*-0.177*
0031	NHS hosp./homes - other	-	-	-	-	-	-
0051	Non-NHS hospitals - other	-	-	-	-	-	-
0061	Local authority homes	0.077	0.035	0.246	-	0.102	0.087
0071	H.A homes and hostels	-	-	-	-	-	-
0081	**Nursing homes – Non-NHS/LA/HA**	**-0.272***	0.024	0.172	-	-0.130	-0.195
0091	**Residential homes - Non-NHS/LA/HA**	-0.210	0.024	0.172	-	**-0.314****	**-0.291***
0101	Children's homes	-	-	-	-	-	-
0111	*Detention, defence, and education*	***-0.272****	*0.024*	*0.172*	-	*-0.130*	*-0.195*
0141	**Educational**	**-0.272***	0.024	0.172	-	-0.130	-0.195
0151	*Other groups*	*0.226*	*0.024*	*0.172*	-	*0.158*	*0.191*
0161	Hotels, boarding houses, etc	0.226	0.024	0.172	-	0.158	0.191
0171	Hostels & common lodging houses (Non-HA)	-	-	-	-	-	-
0181	Other	-	-	-	-	-	-

Table 5.31 Relationship between EwC adjustments and the number of communal establishments in a) all EDs in the City and b) in EDs within Benwell and Scotswood

5.8.10 Relationship between EwC adjustment figures and accommodation not used as main residence

The correlation between EwC and accommodation not used as main residence also confirmed that the number of visitors enumerated by the Census and the student adjustment figures were positively correlated at both scales (Table 5.32). This was expected as most students in the 1991 Census were recorded as visitors in their term-time address and as residents at their home address. The EwC added students to their term-time addresses, which explains this correlation. At the city-wide scale, there was

also a positive association between visitor occupied accommodation not used as main residence and non-response adjustment figures.

a)

SAS62		EwC Adjustment figures					
SAS61	Variable	Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments
0043	Accommodation not used as main residence	**0.667*******	-0.061	0.059	-	0.163	**0.541*******
0057	No persons present	**0.175***	0.011	-0.091	-	-0.016	0.131
0071	Persons enumerated but no residents	**0.675*******	-0.078	0.072	-	**0.180***	**0.558*******

b)

SAS62		EwC Adjustment figures					
S61		Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments
0043	Accommodation not used as main residence	**0.539*******	0.111	-0.037	-	0.191	0.251
0057	No persons present	0.085	0.035	0.035	-	-0.129	-0.085
0071	Persons enumerated but no residents	**0.524*******	0.106	-0.022	-	0.159	0.214

Table 5.32 Relationship between EwC adjustments and accommodation not used as main residence in a) all EDs in the City and b) in EDs within Benwell and Scotswood

5.8.11 Number of imputed residents and dwelling structure

At the city-wide scale, the numbers of imputed residents were higher in EDs with high numbers of flats in residential buildings and lower in EDs with high numbers of semi-detached houses (Table 5.33). These were similar to the associations between D_v and dwelling structure (Section 5.7.1). In Benwell and Scotswood weaker associations between the number of flats in commercial buildings and imputed residents were apparent. This was also similar to the associations between D_v and dwelling structure in these Wards.

a)

	SAS61								
	0003	*0004*	*0005*	*0006*	*0007*	*0008*	*0009*	*0010*	*0012*
	Detached	Semi Detached	Terraced	Flat in res. building	Flat in com. building	Converted flat	Converted flatlet	Not self-contained flat	Bedsit
Imputed residents S010022	-0.156	**-0.356*******	-0.013	**0.322*******	0.143	**0.217****	0.162	0.030	-0.048

b)

	SAS61								
	0003	*0004*	*0005*	*0006*	*0007*	*0008*	*0009*	*0010*	*0012*
	Detached	Semi Detached	Terraced	Flat in res. building	Flat in com. building	Converted flat	Converted flatlet	Not self-contained flat	Bedsit
Imputed residents S010022	-0.055	**-0.458******	0.226	0.211	**0.280***	0.255	0.240	-	-

Table 5.33 Relationship between numbers of imputed residents and dwelling structure in a) all EDs in the City and b) in EDs within Benwell and Scotswood

5.8.12 Number of imputed residents and dwelling tenure

At the city-wide scale, the numbers of imputed residents in EDs, were positively correlated with the numbers of dwellings rented privately or from a housing association and negatively correlated with owner occupied dwellings (Table 5.34). In Benwell and Scotswood, the positive associations were with local authority and housing association rented dwellings. Negative associations with owner occupied dwellings were also found in these Wards.

a)

	SAS62						
	0002	*0003*	*0004*	*0005*	*0006*	*0007*	*0008*
	Owned outright	Buying	Furnished	Un-furnished	Rented with a job or business	Rented from a housing association	Rented from a local authority or new town
Imputed residents S010022	**-0.214****	**-0.216****	**0.262*****	**0.195****	0.044	**0.348******	0.013

b)

	SAS62						
	0002	*0003*	*0004*	*0005*	*0006*	*0007*	*0008*
	Owned outright	Buying	Furnished	Un-furnished	Rented with a job or business	Rented from a housing association	Rented from a local authority or new town
Imputed residents S010022	**-0.389*****	**-0.435*****	0.218	-0.032	-0.082	**0.345****	**0.344****

Table 5.34 Relationship between imputed residents and dwelling tenure in a) all EDs in the City and b) in EDs within Benwell and Scotswood

5.8.13 Number of imputed residents and the number of communal establishments

At the city-wide scale, a weak positive association with the number of communal establishments categorised as 'Other' was found. These included hotels, boarding houses, hostels and common lodging houses (Non-HA)[13]. In Benwell and Scotswood, there were no positive associations with any type of communal establishment, as there were not many such properties in these Wards (Table 5.35).

a)

	SAS03 (Type of Establishment)														
	0001	0011	0031	0051	0061	0071	0081	0091	0101	0111	0141	0151	0161	0171	0181
	Total	Medical & Care Sector	NHS hosp./ homes - other	Non-NHS hospitals - other	L.A homes	HA homes and hostels	Nurs'g homes – Non-NHS/LA/HA	Res. homes - Non-NHS/LA/HA	Child's homes	Deten., defence, and education	Educational	Other groups	Hotels, board. houses, etc	Hostels & common lodging houses (Non-HA)	Other
Imputed residents S010022	0.135	0.062	0.032	-0.048	0.039	0.032	-0.011	0.046	-0.085	0.037	0.037	**0.166***	0.145	0.079	0.056

[13] Appendix 8 - Structure of table SAS03 – Communal Establishments

b)

	SAS03 (Type of Establishment)														
	0001	0011	0031	0051	0061	0071	0081	0091	0101	0111	0141	0151	0161	0171	0181
	Total	Medical & Care Sector	NHS hosp./ homes - other	Non-NHS hospitals - other	L.A homes	HA homes and hostels	Nurs'g homes – Non-NHS/LA/HA	Res. homes - Non-NHS/LA/HA	Child's homes	Detention, defence, and education	Educational	Other groups	Hotels, boarding houses, etc	Hostels & common lodging houses (Non-HA)	Other
Imputed residents S010022	0.011	-0.074	-	-	0.086	-	0.020	-0.292*	-	0.020	0.020	0.170	0.170	-	-

Table 5.35 Correlation coefficients between number of imputed residents and the number of communal establishments in a) all EDs in the City and b) in EDs within Benwell and Scotswood

5.8.14 Number of imputed residents and EwC adjustment figures

At the city-wide scale there was a strong positive association between imputed and residual non-response figures (as expected because the number of imputed residents was an indicator of EwC non-response) and a weaker association between imputed and student adjustment figures (Table 5.36). The weak positive association with student adjustment figures suggested that in the absence of students in their term-time address, the Census imputed more residents. In 1991 the Census enumerated students at their home address and the EwC adjustments added these student numbers back to their term-time address. Explaining the relationship between imputed residents and student adjustments needed further investigation, which was beyond the scope of this study. In Benwell and Scotswood, strong associations with non-response and student adjustments were also present.

a)

		EwC Adjustments					
		Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments
S010022	Imputed residents	**0.280***	-0.064	-0.047	-	**0.767*****	**0.619*****

b)

		EwC Adjustments					
		Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments
S010022	Imputed residents	**0.415*****	0.111	-0.078	-	**0.837*****	**0.830*****

Table 5.36 Correlation coefficients between number of imputed residents and the EwC adjustment figures in a) all EDs in the City and b) in EDs within Benwell and Scotswood

5.8.15 Relationship between imputed residents and accommodation not used as main residence

The numbers of imputed residents in EDs were also positively associated with the numbers of visitor occupied accommodation not used as main residence. This association was also expected and was only apparent at the city-wide scale and not in Benwell and Scotswood (Table 5.37).

a)

	SAS62	Observed differences				EwC Adjustment figures					SAS01
SAS61	Variable	Dv	Do	Dr	Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments	Imputed residents
0043	Accommodation not used as main residence	-0.021	0.145	0.069	**0.667*****	-0.061	0.059	-	0.163	**0.541*****	**0.283****
0057	No persons present	-0.057	0.053	0.023	**0.175***	0.011	-0.091	-	-0.016	0.131	0.112
0071	Persons enumerated but no residents	-0.017	0.148	0.062	**0.675*****	-0.078	0.072	-	**0.180***	**0.558*****	**0.269****

b)

	SAS62	Observed differences				EwC Adjustment figures					SAS01
S61		Dv	Do	Dr	Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments	Imputed residents
0043	Accommodation not used as main residence	**0.316****	0.219	**0.356****	**0.539*****	0.111	-0.037	-	0.191	0.251	0.204
0057	No persons present	0.076	-0.141	0.176	0.085	0.035	0.035	-	-0.129	-0.085	-0.081
0071	Persons enumerated but no residents	**0.299***	**0.268***	**0.281***	**0.524*****	0.106	-0.022	-	0.159	0.214	0.170

Table 5.37 Correlation coefficients between numbers of imputed residents and the accommodation not used as main residence in a) all EDs in the City and b) in EDs within Benwell and Scotswood

5.8.16 Relationship between student and non-response adjustments

These were found significant at both scales (Table 5.38), suggesting that areas with higher numbers of student accommodation were also those with higher non-response adjustments.

a)

	Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments
Students	1.000					
Census day to mid-year timing	-0.040	1.000				
Data modification	0.048	-0.007	1.000			
Armed forces	-	-	-	1.000		
Residual non-response	**0.296****	-0.132	0.024	-	1.000	
Total adjustments	0.743	-0.094	0.087	-	0.767	1.000

b)

	Students	Census day to mid-year timing	Data modification	Armed forces	Residual non-response	Total adjustments
Students	1.000					
Census day to mid-year timing	0.004	1.000				
Data modification	-0.214	-0.172	1.000			
Armed forces	-	-	-	1.000		
Residual non-response	**0.488****	0.015	**-0.330**	-	1.000	
Total adjustments	0.609	0.034	-0.329	-	0.981	1.000

Table 5.38 Correlation coefficients between EwC student and non-response adjustments in a) all EDs in the City and b) in EDs within Benwell and Scotswood, 99.95% *****; 99.5% ****; 99% ***; 97.5% **; 95% *.

5.8.17 Summary of relationships

Significant positive associations with D_v and negative associations with D_o and D_r were noted (Table 5.39), as they indicated associations with Census excess of vacancies and shortfalls of occupied local authority and total residential dwellings. Similarities were noted between associations with the differences (D_v ,D_o and D_r) and with the EwC non-response adjustments and imputed residents at the City scale and in Benwell and Scotswood. At the City scale, strong positive associations were found between D_v , non-response adjustments and imputed residents and with the numbers of flats in residential buildings. A large proportion of EDs with such characteristics, were local authority, housing association or privately rented dwellings. The expected association between Census excess of vacancies (D_v) and imputed residents was not found. Instead, student and non-response adjustments were found positively associated with imputed residents. This was expected because the latter was one of the indicators used in the calculation of non-response adjustments. Although there were no associations found between the differences (D_v ,D_o and D_r) and the number of communal establishments, both EwC student adjustments and imputed residents were found associated with the number of Hotels, boarding houses, hostels or other accommodation of this type. The correlation values did not exhibit any associations between the differences and the number of second homes. It was found however, that the areas with high student and non-response adjustments and imputed residents contained more visitor occupied second homes. This was expected as in the 1991 Census, students were treated as visitors at their term-time address.

In Benwell and Scotswood, similar associations were found between the differences (D_v ,D_o, D_r), non-response, imputed resident and flats in commercial buildings. Local authority or privately rented dwellings were the most common tenures. Similar to the City patterns, both student and non-response adjustments were found strongly positively associated with imputed residents. Negative associations were found between EwC student adjustments and educational establishments. As Benwell and Scotswood contained few accommodations of this type, the associations suggested higher student adjustments in these Wards. Positive associations were also found between EwC student adjustments and visitor occupied second accommodation.

a)

Variable	Structure	Tenure	Imputed residents	Communal Est.	EwC adjustments	2nd Accom
Dv	Flats in res.	LA	-	-	non-response	-
Do	-	-	-	-	-	-
Dr	-	-	-	-	-	-
EwC	Terr/ Flats in res Conv flat/lets	LA/HA	N/A	Student/ Hotels, boarding houses, etc	N/A	Student/Vacant Student and non-response/ Visitor occupied
Imputed	Flats in res/ Conv. flats	PR/HA	N/A	Hotels, Hostels, boarding and lodging houses	Student non-response	Visitor occupied

b)

Variable	Structure	Tenure	Imputed residents	Communal Est.	EwC adjustments	2nd Accom.
Dv	Flats in com Conv. flat/lets	PR	-	-	-	Visitor occupied
Do	Semi Det/Terr (-ve association)	LA	-	-	-	-
Dr	-	PR/HA	-		-	-
EwC	Terr/Flats in com Conv flats	LA/HA	N/A	Student/ Educ. Est. (-ve assoc.)	N/A	Student/ Visitor occupied
Imputed	Flats in com	LA/HA	N/A	None	Student non-response	-

Table 5.39 Summary of relationships in in a) all EDs in the City and b) in EDs within Benwell and Scotswood

Chapter 6 ED Profiles

Chapter Overview

This chapter notes the results of the correlation analysis carried out in the previous chapter and focuses the investigation on individual property records in EDs within Benwell and Scotswood. The implications of the findings are discussed in Chapter 8.

6.1 Introduction

The primary aim of this part of the investigation was to explain the differences and to identify the tenure and structure of the dwellings responsible for the observed differences. Characteristics such as tenure and structure were used in this study in order to illustrate similarities between areas with greater differences and difficult to enumerate areas. These also had larger non-response adjustment figures. Detailed investigation of individual property records was carried out in all EDs within Benwell and Scotswood and selected EDs in West City and various locations of the city with differences higher or lower than the city-wide average. Some EDs adjacent to those with significant differences were also investigated, so that errors in digitised ED boundaries could be eliminated as a contributory factor to the observed differences.

6.2 Method of investigation

The information relating to tenure, structure and occupancy of dwellings were collated as individual items of information from various datasets. All properties in the 1995 Gazetteer were flagged with information from all available sources. This information was added as extra fields in the 1995 Gazetteer shapefile (described in detail in Chapter 4 – Section 4.3).

The investigation of individual EDs, initially compared the total number of residential dwellings, followed by the total number of occupied and vacant dwellings (Figure 6.1). The occupied dwelling numbers in each tenure category were then compared. This was followed by the comparison of dwelling figures in each structure category.

Once the tenure and the structure of dwellings responsible for the observed differences were determined, the individual property records were examined. These records held in the 1995 Gazetteer shapefile, were updated with information from the old properties database, council properties database, 1991 vacant properties database, City Challenge shapefile and the shapefile containing newly built areas. This information was then imported into Access and cross-tabulated, in order to answer questions relating to tenure and structure.

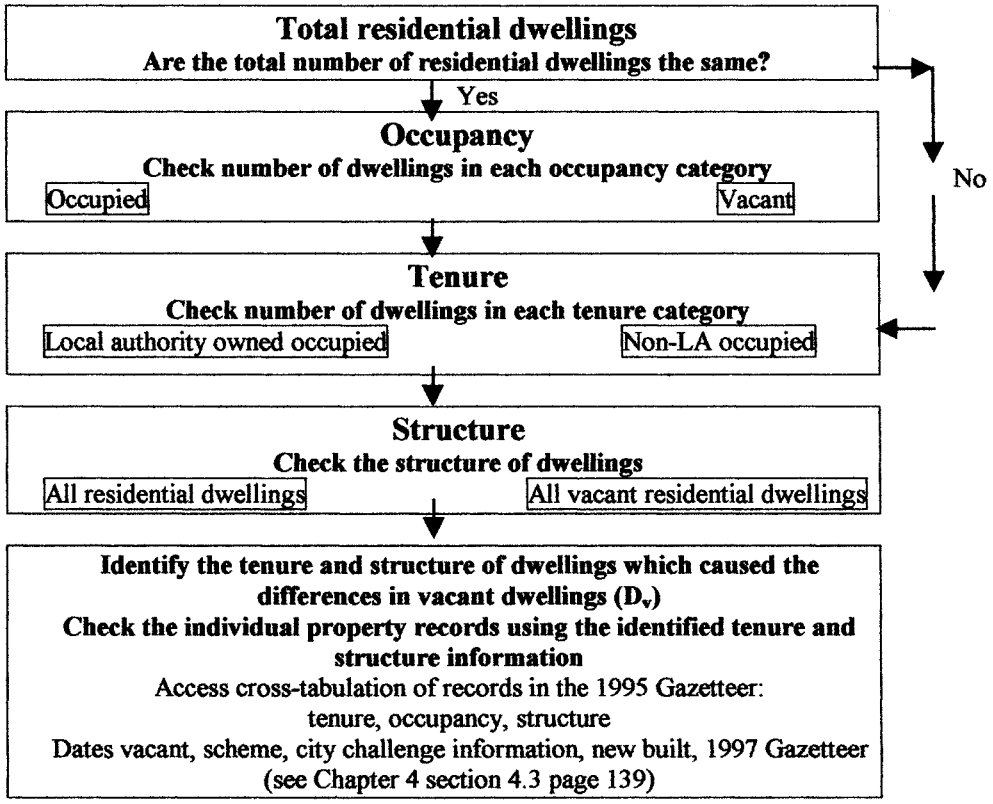


Figure 6.1 Investigation of dwelling figures

6.2.1 Dwelling Occupancy

The Census counts of vacant residential dwellings (S610029) and second accommodation with 'no persons present' (S610057) from table SAS61 (for each ED) were summed and compared to the vacancy figures from the 1991 vacant properties database. The Census counts of total occupied dwellings for EDs were available from both tables SAS61 and SAS62 (S610001). The figures from SAS61 were the sum of dwellings with residents (S610015) and dwellings with 'Accommodation not used as main residence - persons enumerated but no residents' (S610071). Similar local

authority counts of occupied addresses were obtained by subtracting the number of vacancies from the total number of residential dwellings obtained from the 1995 Gazetteer. Occupied local authority council stock were obtained by subtracting local authority vacancy counts from the total number of 1991 council stock. Occupied Non-local authority dwelling counts (in EDs) were the differences between the total occupied and local authority occupied dwelling counts. Some individual property records in the 1991 vacant properties database also included the dates within which the property remained vacant.

6.2.2 Dwelling Tenure

The Census provided the tenure of occupied dwellings only (see Chapter 4). A combination of data sources was used to establish the tenure of addresses in the 1995 Gazetteer. These were identified as council stock, if they matched the addresses in both the council and the old properties databases. The scheme under which the properties were disposed/demolished and the end of tenancy dates associated with these properties were also recorded. The 'code' field in the original 1995 Gazetteer distinguished between private, council and housing association stock.

6.2.3 Dwelling Structure

Information about dwelling structure from the Census was available from table SAS61. Similar information from the local authority sources was obtained from the 1998 council tax database and the Housing Department's HPIS system.

6.2.4 City Challenge Regeneration Scheme

Areas designated to the City Challenge Regeneration Scheme were digitised in-house in order to identify addresses that fell within the boundaries, using the point-in-polygon operation in Arcview.

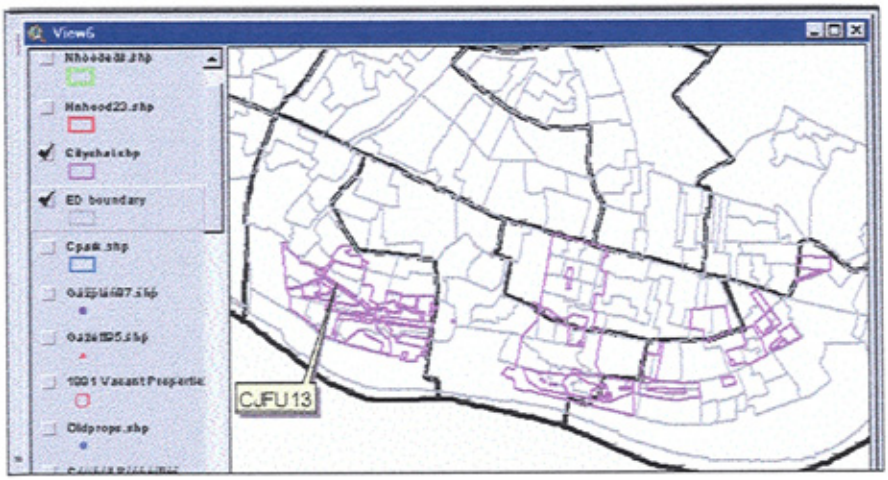


Figure 6.2 Designated areas to the City Challenge Regeneration Scheme

6.3 ED profiles: results

The ED profiles for the 42 EDs in Benwell and Scotswood, highlighted a number of reasons for the Census excess of vacancies (Table 6.1). In 6 (14%) of the total EDs, with the most Census excess of vacancies in Scotswood, the differences were due to the inclusion of vacancies due for demolition. The Census included these as outlined in their definitions (OPCS/GRO(S), 1992), while the local authority Housing Department excluded records of these from their stock list. At the time of the Census, a number of renovations schemes in progress (1990/91 Housing Annual Report). These included the Scotswood Renewal Scheme, City Challenge Scheme and dwellings renovated in designated SRB areas. Census excess of vacancies in 7 (17%) of total EDs were found to be because of property demolitions under these schemes. Other reasons for the observed vacancy differences included those related to shared business and residential addresses (flats) and shared accommodation (Table 6.1). Census excess of vacancies were found to be houses in 15 (36%) and flats in 14 (33%) of the total EDs. The excess of vacancies were found to be non-local authority rented in 18 (43%) and local authority rented in 11 (26%) of the total EDs (Tables 6.2 and 6.3). These results closely agreed with the associations found between Dv and dwelling structure and tenure in Chapter 5 (Sections 5.8.1 and 5.8.2).

Reason for vacancy differences	No. of EDs in Benwell	No. of EDs in Scotswood
Demolished/disposed council properties deleted from the housing mainframe	0	6
Dwellings demolished/disposed within Scotswood Renewal Area	0	3
Dwellings demolished/disposed within SRB boundary	3	0
Shared accommodation	2	1
Flats/Business addresses	2	3
Tenure misclassification	2	2
Dwellings demolished/ disposed as part of local authority refurbishment	2	0
Dwellings demolished/ disposed and within housing association refurbishment boundary	1	0
Dwelling demolished/ disposed and within city challenge area	1	0
Dv=0	4	1
Unknown	4	5
Total	21	21

Table 6.1 Reasons for the observed vacancy differences

Structure	No. of EDs	%	Tenure	No. of EDs	%
Flats	14	33%	Local Authority	11	26%
Houses	15	36%	Non-local authority	18	43%
Mix of Flats/Houses	4	10%	Mix of L.A/Non-L.A	2	5%
Dv=0	6	14%	Dv=0	6	14%
Unknown	1	2%	Unknown	5	12%
Shared Accom.	1	2%			
Tenure misclassification	1	2%			
Total	42	100%	Total	42	100%

Table 6.2 Structure and tenure of the vacant dwellings responsible for the differences

	Structure					
tenure	Flats	Houses	Mix of Flats/Houses	Dv=0	Shared Accom.	unknown
Local Authority	2 (5%)	9 (21%)	-	-	-	-
Non-local authority	10 (24%)	5(12%)	3 (7%)	-	-	-
Mix of L.A/Non-L.A	2 (5%)	-	-	-	-	-
Dv=0	-	-	-	6 (14%)	-	-
Unknown	-	1 (2%)	1(2%)	-	1(2%)	1(2%)

Percentages in brackets based on the total of 42 EDs in Benwell and Scotswood

Table 6.3 Cross-tabulation of structure and tenure of the vacant dwellings responsible for the differences

Non-local authority rented flats were found to be responsible for the observed vacancy differences in 12 (29%) of the total EDs. This was also confirmed by the significant correlation values between observed differences and dwellings rented privately or from a housing association (Section 5.8.2). The Census shortfall of residential dwellings in 6 EDs, in various locations in the City, was found to be because local authority datasets recorded addresses in halls of residence or other communal establishments such as

nursing homes or hospital accommodation, while the Census categorised these separately. In West City, the Census shortfall of residential dwellings was due to the mixture of business addresses in the City Centre area, high rise flats and residential homes (e.g. The Hawthorns and The Poplars) in this Ward. This Ward was ranked 6th among 25 Wards with highest estimated residual non-response adjustments by the EwC project. From the total number of vacant dwellings, the percentages of vacant 'other' dwellings in Benwell (93.6%) and Scotswood (93.4%) were the second and the fifth highest in the city respectively (Table 6.4). This suggested that the enumerators had more difficulty in distinguishing between vacant and derelict dwellings in these Wards.

Ward	Total vacancies L610057	New, never occupied L610071	Under improvement L610085	Other L610099	Vacant 'other' dwellings as % of total vacancies	% of vacant 'other' from total vacant 'other' dwellings in the City
Walker	211	0	7	204	96.7%	3.8%
Scotswood	**630**	**1**	**39**	**590**	**93.7%**	10.9%
Castle	93	1	5	87	93.5%	1.6%
Blakelaw	92	0	6	86	93.5%	1.6%
Benwell	**485**	**0**	**32**	**453**	**93.4%**	8.4%
Monkchester	223	0	19	204	91.5%	3.8%
Lemington	122	2	9	111	91.0%	2.0%
Denton	62	0	6	56	90.3%	1.0%
Woolsington	156	5	11	140	89.7%	2.6%
Jesmond	409	5	38	366	89.5%	6.8%
Fenham	138	0	16	122	88.4%	2.3%
Walkergate	147	3	15	129	87.8%	2.4%
Dene	285	17	19	249	87.4%	4.6%
Wingrove	188	0	24	164	87.2%	3.0%
Westerhope	107	8	7	92	86.0%	1.7%
Newburn	127	6	12	109	85.8%	2.0%
Moorside	248	17	20	211	85.1%	3.9%
Heaton	243	0	39	204	84.0%	3.8%
Sandyford	338	32	26	280	82.8%	5.2%
South Gosforth	163	13	17	133	81.6%	2.5%
Elswick	445	3	85	357	80.2%	6.6%
Grange	148	14	20	114	77.0%	2.1%
West City	795	12	208	575	72.3%	10.6%
Fawdon	262	13	104	145	55.3%	2.7%
Byker	253	95	23	135	53.4%	2.5%
Kenton	335	12	221	102	30.4%	1.9%
City total	6705	259	1028	5418	80.8%	100.0%

Table 6.4 Proportion of vacant 'Other' dwellings from the total number of vacancies – LBS61

Over half (53.4%) of the total vacant dwellings in the City, enumerated by the Census as 'Other', were flats in residential buildings (Table 6.5). This was particularly apparent in West City and Benwell, where 81.6% and 66.9% of vacant dwellings classified as 'Other' were flats in residential buildings. In Scotswood, 65.4% of these were terraced houses.

	L610101	L610102	L610103	L610104	L610105	L610106	L610107	
Ward Name	Detached	Semi Detached	Terraced	Flat in Residential Building	Flat in Commercial Building	Converted Flat	Converted Flatlet	Total %
Benwell	1.1%	9.3%	18.1%	**66.9%**	2.0%	2.6%	0.0%	100.0%
Blakelaw	2.3%	37.2%	32.6%	27.9%	0.0%	0.0%	0.0%	100.0%
Byker	0.0%	1.5%	28.9%	68.1%	1.5%	0.0%	0.0%	100.0%
Castle Ward	19.5%	48.3%	19.5%	10.3%	0.0%	2.3%	0.0%	100.0%
Dene	8.8%	20.9%	6.4%	61.8%	2.0%	0.0%	0.0%	100.0%
Denton	7.1%	17.9%	12.5%	62.5%	0.0%	0.0%	0.0%	100.0%
Elswick	0.3%	5.9%	19.0%	69.2%	2.8%	2.8%	0.0%	100.0%
Fawdon	3.4%	21.4%	9.0%	64.1%	2.1%	0.0%	0.0%	100.0%
Fenham	0.8%	43.4%	31.1%	20.5%	4.1%	0.0%	0.0%	100.0%
Grange	14.0%	25.4%	22.8%	35.1%	1.8%	0.9%	0.0%	100.0%
Heaton	0.0%	7.4%	20.1%	57.8%	6.9%	7.8%	0.0%	100.0%
Jesmond	1.4%	3.0%	15.4%	44.9%	1.9%	30.9%	2.5%	100.0%
Kenton	7.8%	28.4%	24.5%	32.4%	5.9%	1.0%	0.0%	100.0%
Lemington	7.2%	26.1%	47.7%	14.4%	3.6%	0.9%	0.0%	100.0%
Monkchester	0.0%	2.9%	18.1%	69.1%	7.8%	2.0%	0.0%	100.0%
Moorside	0.5%	0.5%	16.6%	73.0%	3.3%	6.2%	0.0%	100.0%
Newburn	10.1%	21.1%	29.4%	38.5%	0.9%	0.0%	0.0%	100.0%
Sandyford	0.0%	3.2%	16.4%	75.4%	1.8%	2.5%	0.7%	100.0%
Scotswood	0.2%	10.8%	**65.4%**	18.3%	2.2%	3.1%	0.0%	100.0%
South Gosforth	7.5%	18.0%	22.6%	41.4%	3.8%	6.8%	0.0%	100.0%
Walker	1.0%	2.9%	34.8%	58.8%	2.5%	0.0%	0.0%	100.0%
Walkergate	0.8%	38.8%	13.2%	43.4%	3.9%	0.0%	0.0%	100.0%
West City	0.3%	0.0%	9.6%	**81.6%**	3.5%	4.9%	0.2%	100.0%
Westerhope	7.6%	56.5%	13.0%	17.4%	5.4%	0.0%	0.0%	100.0%
Wingrove	0.6%	12.8%	30.5%	50.0%	3.7%	1.8%	0.6%	100.0%
Woolsington	4.3%	6.4%	26.4%	62.9%	0.0%	0.0%	0.0%	100.0%
Total	2.5%	12.2%	24.3%	53.4%	2.9%	4.4%	0.2%	100.0%

Table 6.5 Structure of vacant 'Other dwellings – LBS61

As an illustration of the analysis at the individual property scale, EDs CJFU13 and CJFA07 were selected and are described in this chapter. The analysis of the remaining EDs within these Wards, are included in Appendix 7.

ED profile: CJFU13 : $D_o = -43$, $D_v = 40$, $D_r = 0$

Both the Census and the 1995 Gazetteer, recorded the same number of residential dwellings (210) in this ED (Table 6.7). The Census proportions of vacant (61) and occupied dwellings (147) however, did not match those from the datasets (21 vacant and 189 occupied dwellings). The Census excess of 40 vacancies was one of the largest in Benwell Ward. The majority of Census occupied dwellings (143) were local authority

rented terraced houses. This was significantly less than the dataset figure (189). A small number of these dwellings (4) were rented with a job or a housing association, which closely matched the dataset figure (3). The difference in occupied dwellings were because of the low dataset vacancy figure (21) from the 1991 vacant properties database, compared to that from the Census (61). The Census did not identify the proportion of local authority vacancies, but according to the local authority datasets, the majority of these (20) were local authority rented dwellings. Considering all the available information, it was found that the extra 40 vacancies recorded by the Census were local authority rented terraced houses. Individual property records were then examined in order to find the possible explanations for the observed differences (Figure 6.3). Cross-tabulations of records in Access database (part of which is presented in Table 6.6), which combined the information from all local authority datasets, showed that large number (99) of properties were demolished as part of the City Challenge Regeneration Scheme.

Business	Code	91 Vac DB	CP	OP	Date1	Date2	Scheme	EoT Date	Description1	Not in City Challenge Area	Demolished not redeveloped	Housing Assoc. Refurbishment Completed	LA Refurb. completed	Total No. of properties
b										1				1
r	2			7			Ferguson's Lane	19921019	HOUSE				1	1
r	2			7			Improved for sale	19930216			5			5
r	**2**			**7**			**Improved for sale***	**19930402**			**40**			**40**
r	2			7			Improved for sale	19941013			3			3
r	2	m		7	1/2/91	31/3/93	Improved for sale	19941109			1			1
r	2	m		7	1/4/90	31/3/93	Improved for sale	19941013			1			1
r	2	m		7	1/4/90	31/3/93	Improved for sale	19941109			2			2
r	2	m	c						HOUSE				5	5
r	2	m	c		1/4/90	17/8/92			HOUSE				1	1
r	2	m	c		21/1/91	29/3/92			HOUSE				1	1
r	2	m	c		21/6/90	14/9/92			HOUSE				1	1
r	2	m	c		24/2/91	20/9/92			HOUSE				1	1
r	2	m	c		5/7/90	6/12/92			HOUSE				1	1

Table 6.6 – part of the cross-tabulated information about properties within CJFU13 - * Woodstock Road

The end of tenancy dates associated with these properties were between 1992 and 1995. In order to establish whether these were standing vacant on Census night, the information in the 1991 vacant properties database was used. Although the actual records of these properties did not appear in this database, the presence of records of adjacent terraced houses found vacant on Census night, confirmed that these properties were also standing on Census night. It was therefore concluded that the records of 40 extra properties were missing from the 1991 vacant properties database as a result of the data maintenance procedures. Records of these properties, which were due for demolition, were taken off the housing mainframe by the Housing Department and

stored in the old properties database (Chapter 4). These therefore did not appear in the 1991 vacant properties database, which also originated from the housing mainframe.

Figure 6.3 Map of ED: CJFU13

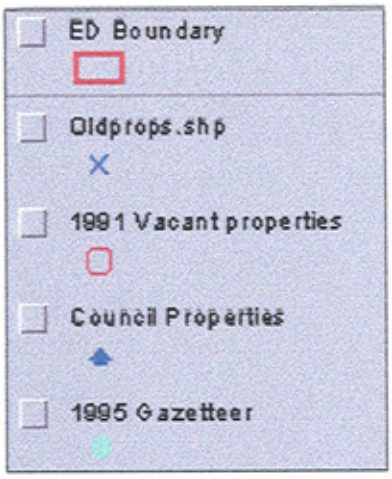


Figure 6.4 Map legend

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	210	Residential addresses	210
			Business addresses	1
			Total addresses	211
			Council properties	107
			Old council properties	99
			1991 council stock	206
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.			
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	0	House	127
S610005	Terraced	210	No Entry	84
S610006	Flat in res building	0	Flat	0
S610007	Flat in com. building	0		
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	148/147	Residential addresses – All vacancies	210-21 = 189
S620002	Owned outright	0	Non-LA occupied properties	189-186=3
S620003	Buying	0		
S620004	Furnished	0		
S620005	Un-furnished	0		
S620006	Rented with a job or business	2		
S620007	Rented from a Housing Association	2		
S620008	Rented from a local authority	143	1991 council stock – local authority vacancies	206 – 20 = 186
S610029 + S610057	Vacant dwellings and 2nd accom	61	All vacancies (Local authority vacancies)	21 (20)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	0	House	16
S610033 + S610061	Terraced	61	No Entry	5
S610034 + S610062	Flat in res. building	0	flat	0
S610036 + S610064	Converted Flat	0		0

Table 6.7 ED Profile : CJFU13

ED profile: CJFA07: $D_o = -1$, $D_v = 22$, $D_r = -44$

The Census figure of total residential dwellings (201) in this ED was lower than that from the local authority sources (245). This difference (Table 6.9) was due to the single shared dwelling (Benwell Towers South Lodge) present in this ED. Records of the individual addresses within this dwelling were included in the 1995 Gazetteer, while the Census only counted this as one dwelling, hence the Census shortfall of residential dwellings. This was confirmed by the large difference (71) in the number of flats from the two sources. The proportions of occupied and vacant properties were also different. The Census recorded 168 occupied dwellings and 33 vacancies, while the local authority datasets recorded 234 occupied and only 11 vacancies. The difference in occupied properties was also partly due to the different data collection methods and the lower local authority vacancy figure. The vacancy difference was explained further using the dwelling structure information. The Census recorded more vacant houses than

the 1991 vacant properties database, but the number of vacant flats were close from both sources (9 according to the Census and 10 according to local authority datasets).

The number of occupied local authority rented dwellings according to the Census (90) closely matched the local authority figure (91). Occupied non-local authority figures however, were different, 78 according to the Census and 143 according to the local authority sources. Considering all the available information, it was concluded that the difference in the total counts of residential dwellings was due to the differences in data collection methods. The difference in occupied dwellings was partly due to inconsistent data collection methods and partly due to a low vacancy figure according to the local authority datasets. The Census recorded 22 non- local authority rented vacant houses (Figure 6.5 and Table 6.9), more than the local authority datasets, the reasons for which could not be found from the individual records of these properties (Table 6.8).

B	C	V	C P	O P	Date1	Date2	EoT Date	Description	OC.C	Dem.	HA/P	Imp.	LA /C	S R B	Total No. of Adds
b									17						17
r	1								3						3
r	1							1ST & 2ND FLOOR FLAT	1						1
r	1							1ST FLOOR FLAT	25						25
r	1							FLAT	6						6
r	1	m						Ground Floor Flat & Garage	1						1
r	1	m			1/4/90	10/11/91		FLAT 1ST & 2ND FLS	1						1
r	1	m			1/4/90	13/10/91		GROUND FLOOR FLAT	1						1
r	1	m			1/4/90	29/1/92		FLAT FIRST & SECOND FLOORS	1						1
r	1	m			1/4/90	31/3/93		FLAT FIRST & SECOND FLOORS	1						1
r	1	m			21/6/90	12/1/92		FLAT FIRST FLOOR & GARAGE	1						1
r	1	m			24/11/90	6/7/91			1						1
r	2							FLAT	3						3
r	2							VIEWHOUSE	1						1
r	2			6			1990 0831	HOUSE	1						1
r	2			6			1991 1114	HOUSE	1						1
r	2		c					FLAT 1ST & 2ND FLS	1						1
r	2		c					GROUND FLOOR FLAT	1						1
r	3							HOUSE	2						2
r	3	m						GROUND FLOOR FLAT	1						1

O.C.C – Outside City Challenge Area
V – Vacant
B – Business
C – Code
LA/C – Local Authority refurbishment completed
HA/P – Housing Association Refurbishment planned
C.P – Council properties database
O.P – Old properties database
Imp. – Improved for Sale
Dem. - Demolished

Table 6.8 – Some of the cross-tabulated information about properties within CJFA07

Figure 6.5 Map of ED: CJFA07

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Adds
S610001	Total residential dwellings	201	Residential	245
			Business	17
			Unknown	5
			Total addresses	267
			Council properties	91
			Old council properties	1
			1991 council stock	92
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.			
S610003	Detached	3	Bungalow	0
S610004	Semi Detached	58	House	140
S610005	Terraced	115	No Entry	26
S610006	Flat in res building	16	Flat	94
S610007	Flat in com. building	5	Maisonette	1
S610008	Converted. Flat	3	Rooms (Domestic)	2
S6100013	Shared Dwelling	1	Shop & premises	2
			Sales info. Centre	1
			Show house	3
S610015 + S610071)/S620001	Dwellings with residents or visitors	167	Residential addresses – All vacancies	201-11 = 190
S620002	Owned outright	4		
S620003	Buying	24		
S620004	Furnished	22		
S620005	Un-furnished	16		
S620006	Rented with a job or business	1		
S620007	Rented from a Housing Association	11		
S620008	Rented from a local authority	90	1991 council stock – local authority vacancies	92 – 1 = 91
S610029 + S610057	Vacant dwellings and 2nd accom	33	All vacancies (LA vacancies)	11 (1)
	Structure of vacant dwellings			
S610031 + S610059	Detached	1	Bungalow	0
S610032 + S610060	Semi Detached	1	House	1
S610033 + S610061	Terraced	21	No Entry	1
S610034 + S610062	Flat in res. building	9	flat	9
S610036 + S610064	Converted Flat	1		

Table 6.9 ED Profile :CJFA07

Chapter 7 Discussion

Chapter Overview

This chapter discusses the findings of the thesis in the context of literature reviewed in Chapter 2. Following a brief introduction (Section 7.1), the contribution of Chapters 3, 4 and 5 in reaching the original aims of the thesis (Section 1.2) are highlighted in sections 7.2,7.3 and 7.4.

7.1 Introduction

Data integration, interpretation and the explanation of differences between dwelling counts, formed the main parts of this study. In section 7.2, data integration, the problems encountered and the lessons learnt are discussed in the wider context of recent GIS developments in local authorities (Chapter 2 section 2.2.1). In explaining the differences between dwelling counts, the study also explored the potential uses of local authority data, in conjunction with Census data for GIS-based spatial analysis. Integrating local authority disparate data sets was one of the suggested areas for further research (Bromley and Selman, 1993; Worrall, 1992; Higgs, 1994).

Section 7.3 discusses data interpretation and the issues raised when identifying suitable variables and constructing comparable figures. The section discusses the findings in response to suggestions of more research involving housing data (Higgs, 1994), the implications of non-response on key policy areas such as housing (Simpson, 1994), and Census preparatory work (OPCS/GRO(S), 1996).

Section 7.4 places the explanations for the observed differences (Chapters 5 and 6) within the context of the reasons for the national Census underenumeration of residents. It also investigates the relationship between these differences and the adjustment figures of the EwC project.

7.2 Data Integration

Data integration, was the first stage of assessing the potential uses of available data from the Housing Department for spatial analysis. This is an area where relatively little research has been carried out, but the benefits for many areas such as policy decision-making and Census preparatory work have been noted (Higgs, 1994; Simpson, 1993; OPCS/GRO(S), 1995b, Owen, 1995). The relatively slow progress in the research in this area has been due to the organisational problems within local authorities. Three main reasons for this were discussed (Chapter 2 – section 2.2.1). The neglect of the 'human environment' (Bromley and Selman, 1993), data ownership (Peel and Davies, 1997) and cost (Masser and Campbell, 1994; Blackman et. al., 1994). Evidence of these problems was also made apparent during the course of this study. Chapter 3 documented the problems associated with the simple task of comparing dwelling figures from the two sources. These were problems associated with resolving definitions, identifying data sources and geo-referencing the range of datasets from the Housing Department, Planning Department, Housing Benefit section, Council Tax section and TWRIU.

7.2.1. Understanding terms and definitions and identifying data sources

A comprehensive understanding of the terms and definitions used in both sets of data formed the basis for the subsequent spatial analysis and correct interpretation of the results. Reference to the importance of understanding the underlying definitions in administrative data have been mentioned in some studies (Martin *et al.*, 1992; OPCS/GRO(S), 1995b). These have been emphasised in this study, as the local authority terms and definitions were compared to those used by the 1991 Census. It was found that due to the differences in the purposes of the responsible organisations, some understanding of the methods of data collection used by both sources was necessary. The following observations were made:

Terms and definitions used by the 1991 Census were 'designed to capture the true reflection of reality' (Heady *et al.*, 1996). These however, appear to have generated confusion among residents, enumerators and researchers alike (Heady *et al.*, 1994).

'The coverage check had noted two or more distinct households within the same building had frequently been counted as a single household, but was not able to tell whether the confusion had arisen because people did not understand the term household or simply because enumerators had failed to collect the necessary information ...'

(Heady *et al.*, 1996)

Similarly, flats, houses, bedsits and rooms were described in terms of shared or un-shared dwellings, unattached household spaces, self-contained or non self-contained household spaces. The total number of dwellings was then calculated using a computer algorithm that totals the counts of household spaces matching the definition of a dwelling under Census terms. Categorising accommodation as occupied or empty was carried out using a hierarchical classification table. For example, a dwelling comprising of two vacant and one occupied household space, was classified under 'with residents-persons present' category. 'Dwellings' and 'households' used by the Census, are key variables in the complex processes of central government resource distribution and housing needs estimates. If they are to be incorporated in local analysis together with local authority data, there should be more co-ordination between the definitions used in these data sources. In the 2001 Census, one of the key objectives was 'to improve the ability of users to compare Census data with other government sources of statistical information' (Teague, 1999). The harmonisation of Census concepts and definitions with the Government's SSA indicators was one of the new strategies used in the 2001 Census (ONS, 2002).

Dwellings categorised as 'vacant other', also caused concern about the accuracy of Census vacancy figures. According to Census definitions (OPCS/GRO(S), 1992) some vacant properties classified as 'Other' may not have been in the housing market (Chapter 3 - Section 3.2.1). This explained the majority of the Census excess of vacancies compared to local authority datasets, in Benwell and Scotswood. Around the time of the 1991 Census a high proportion of properties in these Wards were boarded up, awaiting demolition. These were therefore excluded from the Housing Department's stock list. The Census however included vacant dwellings that were due for demolition, as 'known future plans... should not have been taken into account'. The reason for this given by the OPCS (1992) was that the Census was 'a snapshot of the housing stock at a

point in time'. This reason however did not apply to vacancies previously used as hotels or boarding houses (considered as communal establishments). These were counted as vacant private residences because of their 'tendency to move in and out of the private housing market' (OPCS/GRO(S), 1992; 24). In this case, the Census seemed to have taken past and future plans into account.

7.2.2. Geo-referencing

This was the most time-consuming task in the study, and one that also remains a continuing problem faced by many authorities (Radburn, 1999; Harrison and Robertson, 1997). Several methods were considered to automate this task as much as possible, however some manual record matching was necessary. Arcview's geo-coding facility, the Soundex technique and manipulation of text strings using Qbasic programmes were carried out but none were completely successful. Several commercial companies have claimed to offer solutions to this problem, but the individuality of addresses meant that manual matching of individual records was always necessary. In this study, ESRI's geo-coding facility for example, was initially considered, but this used the US style address format. The cost of customising this software to use UK style addresses meant that in practice, this was not an option. The limited resources available within local authorities for costly software such as these was identified as one of the problems of GIS implementation (Blackman *et al.*, 1994). The geo-referencing task also involved resolving two referencing schemes used by the Housing and Planning Departments of the authority. Unifying referencing schemes has also been reported as one of the problems facing local authorities when implementing GIS (Peel and Davies, 1997; Martin *et al.*, 1994).

Address matching problems were encountered during linking referencing schemes and when updating datasets with grid co-ordinates. These problems continue to be the most commonly experienced by local authorities (Higgs and Martin, 1995b). At the inception of this study, the best available sources of grid co-ordinates were the authorities LPG Gazetteer and council stock list. The use of this Gazetteer in the present study, has been similar to that of Address-Point in the study by Martin & Higgs (1995) (Chapter 2 - section 2.6.4), where the number of residential addresses were compared to the number of households. Address-Point was made available in 1996, but the accuracy and

completeness of the co-ordinates within this were poor compared to the Gazetteers within the authority. In recent years, many other authorities have also reported their preference of in-house gazetteers to Address-Point. Difficulties of accessing an up-to-date version of this product, limited financial resources and lack of familiarity with the data has meant that the authorities prefer in-house datasets. These include more detailed local information and hence are more suited to their needs.

The quality of the LPG Gazetteer and the authority's gradual progress in updated this dataset, added to the difficulties encountered. The process of correcting the co-ordinates within this gazetteer, highlighted data maintenance issues within the authority. Staff at three departments were involved with data maintenance. This duplication of effort has been identified as one of the many problems that continue to plague successful implementation of GIS in local authorities (Lopez and Duncan, 1995). Although the introduction of BS7666 has encouraged local authorities to standardise data in preparation for its spatial analysis within GIS, in practice the successful implementation of GIS has very much been a learning experience, during which new problems have contributed to its relatively slow progress.

An alternative to geo-referencing individual addresses was the use of the ED/Postcode directory. This was not used in this study because of the poor quality of postcodes within datasets. Furthermore, it was found that errors within the directory, resulted in the allocation of many addresses to the wrong EDs. This problem (Chapter 3 – section 3.3.6) has been acknowledged (Reading and Openshaw, 1993; Gatrell *et al.*, 1989; Martin, 1992), hence the use of this directory was not found suitable for the small scale analysis used in this study.

Previous literature has in the main reported on successful GIS projects with the aim of encouraging GIS implementation. There have been relatively few studies outside the academic community, that focus on the problems of spatial analysis in detail (Radburn, 1999; Smith 1998). Problems have been discussed in relation to the GIS implementation process (Bromley and Selman, 1993; Peel and Davies, 1997; Masser and Campbell, 1994). Other literature has focused on data collection, integration and data mining/warehousing (Fisher, 1991; Charlton *et al.*, 1995; Gerland, 1998; Judson *et al.*, 1997). This study has illustrated known problems associated with GIS implementation

and data integration. In addition it has highlighted the problems associated with the spatial analysis of local authority data in the context of the investigation of Census underenumeration of dwellings. The study also aimed to assess whether meaningful information could be obtained from datasets collected for different purposes, with emphasis on both benefits and pitfalls.

7.3 Data Interpretation

Data interpretation (Chapter 4), involved the identification of suitable variables, investigation of data aggregation and the construction of comparable figures. This process emphasised the difficulties in yielding meaningful information from administrative datasets, for research purposes. This is an area of research suggested in several studies (Higgs, 1994; Bourke 1996). Several observations were made:

It was not possible to obtain the total number of council stock (both occupied and vacant) from the Census, because of the absence of vacant council stock figures. Obtaining such basic counts frequently used by local authorities, involved learning Census definitions, searching for the relevant tables, studying Census table structures and the identification of the dispersed components of variables. Considering the importance of the Census in the local authority administrative functions, this process seemed far too time-consuming to be carried out within local authorities with often limited resources. This raised concerns about the 1991 Census structure and its output methods. This in turn raises questions about whether local authority administrative data can be used for local estimates of housing need as suggested in the literature (Niner, 1989).

The problems of data interpretation encountered in this study were identified as the neglect of human environment by Bromley and Selman (1993). This was defined as the gap between GIS suppliers and GIS consumers in local authorities (Chapter 2 – section 2.2.1). In this study, the interpretation of the local authority datasets, required some knowledge about the functions of the relevant departments responsible for data collection, data maintenance routines and housing policy issues, while the interpretation of Census data, required detailed knowledge of Census data structure, data collection and definitions. This process complemented the technical tasks of preparing data for use

within GIS. The decision to use the Planning Department's LPG Gazetteer for example, involved investigating data sources, the computer systems in place, the referencing schemes and the updating procedures. The process of joining this with data sources to obtain information about dwelling structure, tenure and occupancy, highlighted the problems and benefits of creating value-added datasets. The neglect of this resource intensive task was noted (Chapter 2 - Section 2.2.1) by Worrall (1992) as one of the problems in local authorities with limited financial resources, that consider corporate GIS development.

Another example was finding the reasons for the absence of some vacancies in the 1991 vacant properties database, which resulted in the significantly higher Census vacancy figures than the datasets in Benwell and Scotswood. This dataset was created by the previous 'Community Charge' section of the authority, but was obtained from the computer section. The number of vacancies was examined by first understanding the methods used to collect Community Charge information. The old properties database, maintained by the Housing Department, was also examined. It was found that there were no direct links in the updating procedures of these datasets, even though they were both held on the same housing mainframe. This meant that any changes to the housing stock was not always reflected in the Community Charge records. The lack of a corporate approach in co-ordinating local authority data was one of the issues noted in the Modernising Government White paper (DETR, 1999b) and the e-government strategy (DETR, 2000c). These are discussed further in Chapter 8 (Section 8.3). In response to the suggestion that local authority data could be used as part of Census preparatory work (OPCS/GRO(S), 1996), this study has illustrated that the comparison of these datasets can only give an indication of the areas where the greater enumeration difficulties are likely to occur. Areas with large numbers of communal establishments, businesses, shared dwellings as mentioned by some of the national studies of Census underenumeration (Simpson, 1993; OPCS, 1993; Heady *et al.*, 1994), were also highlighted in this study.

7.4 Spatial Patterns

At the city-wide scale, the Census recorded fewer vacancies and more occupied council stock, than the local authority datasets. The total number of residential dwellings was

also slightly higher than the datasets. The correlation analysis at this scale, suggested that the Census excess of vacancies was greater in EDs with more local authority rented flats. The pattern in Benwell and Scotswood was the opposite to that at the city-wide scale, the Census appeared to have recorded too many vacancies and undercounted residential and occupied council properties. The correlation analysis of EDs within Benwell and Scotswood, suggested that the Census recorded more vacancies in EDs with greater numbers of privately rented flats in commercial buildings and converted flats/flatlets. Evidence of this was found in 12 EDs within these Wards, which were detailed in Chapter 6. In Benwell and Scotswood, the Census excess of vacancies was in EDs where major renovation work or demolitions were taking place around the time of the 1991 Census. These included Scotswood Renewal Area, designated areas to the City Challenge Regeneration Scheme and SRB areas. The Census also appeared to have recorded fewer residential dwellings than the local authority datasets, in EDs where there were a high proportion of business addresses with residential flats, shared dwellings, halls of residence or nursing/residential homes (for example West City). This discrepancy was mainly as a result of inconsistent data collection methods used by the Census and the local authority. This association however, was only found to be significant in Benwell and Scotswood. It was therefore not possible to generalise about the degree of Census underenumeration of dwellings from the analysis of the observed differences at ED resolution.

The role of second homes in the observed differences was also investigated using the correlation analysis. There were no associations at the city-wide scale, but in Benwell and Scotswood, significant positive associations were found between the differences in all three variables (Dv, Do, Dr) and visitor occupied second homes. These included dwellings occupied by students, as the 1991 Census enumerators recorded students as visitors at their term-time address. This association suggested that the Census excess of vacancies was greater in EDs with a large number of student occupied dwellings. The high proportions of vacant dwellings categorised in the Census tables as 'Other' in Benwell (93.6%) and Scotswood (93.4%), provided further evidence of the difficulties in the enumeration of vacant dwellings in these Wards. According to the Census definitions (OPCS/GRO(S), 1992), in case of uncertainties, the enumerators were advised to categorise derelict dwellings as vacant. These were mainly (66.9%) flats in residential buildings in Benwell and terraced houses (65.4%) in Scotswood. West City

Ward included the highest proportion of vacant 'other' dwellings in the city (81.6%). This Ward included large numbers of business addresses in the city centre areas of the City, high rise flats and nursing homes. The observed differences found in this study were also correlated with EwC adjustment figures, in response to some of the questions raised when reviewing the literature covering EwC project (Chapter 2 – section 2.5). This highlighted a positive association between the Census excess of vacancies and EwC non-response adjustments at the city-wide scale. This association however was not found in Benwell and Scotswood. Instead, EwC student adjustment were found to be positively correlated with the Census excess of occupied council stock and total residential stock. The large number of properties privately rented by students in Benwell and Scotswood, would have resulted in the observed associations.

The numbers of imputed residents (Chapter 2 – sections 2.5.4 and 2.5.5) were also included in the correlation analysis in order to test whether imputed residents were associated with Census excess of vacancies. The correlation analysis was also carried out in order to find evidence of the reported errors (Heady P. *et al.*, 1994) associated with the imputation process. There were no positive associations at either the city-wide scale or in Benwell and Scotswood, between the differences (Dv, Do and Dr) and the number of imputed residents. As expected, positive association was found between the number of imputed residents and the EwC non-response and student adjustment figures at both city-wide scale and in Benwell and Scotswood. Explanation of the observed differences in vacancy counts, occupied council stock and total residential dwellings found Census excess of vacancies in some areas. These however, could not be attributed entirely to Census underenumeration of dwellings. These were found to be the result of different definitions and data collection methods used by the Census and the local authority. This was made apparent after examining individual property records together with other available information about the policies in place at that time.

Chapter 8 Conclusion

Chapter Overview

This chapter brings together the findings and the original aims of the thesis (Section 1.2). Section 8.1 introduces the main points in the chapter. The individual findings of Chapters 3, 4 and 5 are discussed collectively, highlighting the contributions to understanding the nature of Census underenumeration of dwellings (Section 8.2). The implications of the study for theory, policy and practice are discussed in sections 8.3 followed by the limitations of the study in section 8.4. Section 8.5 discusses further implications of the study in relation to the 2001 Census and the final section (8.5) suggests areas of work for future research.

8.1 Introduction

An apparently simple task of comparing dwelling counts from the Census and the local authority datasets, unravelled a host of problems. These included resolving definitions, geo-referencing and identifying variables through to explaining the observed differences. Nevertheless, throughout the study, it was made apparent that in practice many local authorities are faced with similar problems. Documenting these, together with solutions, insights and comparisons with previous research were part of the main objectives of this thesis.

8.2 Census underenumeration of dwellings

OPCS (1994) identified several reasons for Census underenumeration of residents in 1991. One of these was errors in the coverage of households and accommodation (Chapter 2 – Section 2.4.1), which included:

1. failure to identify all residential accommodation.
2. failure to identify all households and household spaces within multi-occupied accommodation. (e.g. tower blocks)
3. misclassification of accommodation, for example classifying wholly absent households as vacant, or vice versa.

Comparing Census dwelling counts with those from the local authority sources in this thesis, found evidence of all these errors. The observed differences in total residential dwelling counts, occupied council stock and vacant dwellings could not however be attributed entirely to Census errors. This was because of the different data collection methods and definitions used by the Census and the local authority datasets.

8.2.1 Data integration and interpretation

The concerns regarding the definitions of household and dwellings and suggestions of using addresses or delivery points (OPCS/GRO(S), 1995b), were found valid in this study. Resolving definitional difference will be necessary, if the Census and local authority data are to be used for research, policy or Census preparatory work. The Census definition of communal establishments makes it difficult to compare these figures from the two sources. Communal establishments were only treated as such by the Census, if less than half all residents had their own separate cooking facilities. The constituent addresses within this type of accommodation in the local authority datasets however, could not be distinguished as belonging to a communal establishment. In the 2001 Census, this definition was changed to those 'providing managed residential accommodation' (ONS, 2001), which does not provide comparable figures to those from the local authority datasets.

Vacancies previously used as small hotels or boarding houses were considered as a private residence, by the Census. Communal establishments however, which include hotels and boarding houses were categorised separately. This could result in high total residential counts of dwellings by the Census. In this study, the 1991 vacancies database included vacancies in communal establishments in order to match the figures from the Census.

The high counts of vacancies classified as 'Other' in Benwell and Scotswood, confirmed the known indications (OPCS/GRO(S), 1992; Heady *et al.*, 1994) of misclassification between the 'Under improvement' and 'Other' categories of Census vacancy figures. Furthermore, vacancies classified as 'Other' were not all in the housing market. This was the cause of Census excess of vacancies in most EDs within Benwell and Scotswood.

8.2.2 Observed differences

The Census count of residential dwellings (119767) was slightly less than that from the local authority datasets (120215). This shortfall was more than the city average in Benwell, Scotswood and West City.

The Census count of vacant dwellings in the City (6862) was significantly less than that from the local authority's 1991 vacant properties database (9116). The majority of this difference was due to definitional differences between dwellings (recorded by the Census) and addresses (recorded by the local authority). The Census counts of vacancies however, were significantly more than the local authority figures in Benwell and Scotswood.

The analysis of 42 EDs within Benwell and Scotswood, showed that the Census excess of vacancies in these Wards was due to the high proportion of properties awaiting demolition or renovation at the time of the 1991 Census. The majority of these were privately rented flats. The ED analysis also revealed that Census shortfalls of residential dwellings were more in areas with large proportions of flats (e.g. Benwell and Scotswood) and large proportions of high-rise flats, businesses, and residential homes for the elderly (e.g. West City Ward).

Comparison of Census and local authority administrative data can successfully be used to highlight areas with differences much greater than the City average. This could also be used as an indication of areas more prone to Census underenumeration, as suggested by OPCS (1995).

8.2.3 Comparison of the findings with the EwC project

At the city-wide scale, the areas where the Census found more vacancies than the local authority data, were also those with high EwC non-response adjustment figures. The same pattern but weaker association was found in Benwell and Scotswood. As expected, at the City scale, the areas with high student and non-response adjustment figures, also had large numbers of imputed residents and visitor occupied second

homes. In Benwell and Scotswood, only the student adjustment figures were positively correlated with visitor occupied second homes.

8.3 Integration of Census and local authority data for policy and research purposes

The benefits of local authority administrative data for policy purposes have been widely recognised in the academic literature. During the course of the study however, it was made apparent that the spatial analysis techniques used in academic research were not easily applied to routine policy making functions within the authority. Following the publication of the 'Modernising Government' White Paper (DETR, 1999b), more emphasis has been placed on data integration, data collection, data cleaning, data sharing, address-matching and meta-data collection. The paper outlined 'a new target of all dealings with government being deliverable by 2008' (DETR, 1999b; 5). The e-government strategy (DETR,2000b) that followed noted the wide gap between information technology development in government with that in the commercial businesses world. This suggested that the problematic 'decentralised approach to IT development' must change to 'joined up working between different parts of government'. The targets set out for local government (DETR, 2000d) noted that both local and central government are only beginning to realise the potentials of shared data and resources (DETR, 2000d). In addition, it was noted that links between national agencies and local authorities are necessary to facilitate joining up at the local level (DETR, 2000d). 'Corporate approaches to managing information and the use of information technology' were suggested for the improvement of the local service delivery by local authorities (DETR, 2000c; DETR, 2000d).

This study served as an illustration of the problems that are likely to occur when combining nationally collected data (such as the Census) and those gathered at the local level. It has also illustrated how, despite uncertainties, the best use of the data can be made and interpreted, hence providing for a better service delivery at the local scale. Based on the problems encountered in this study, the government's target of electronic service delivery of 2008 seems unrealistic. There is also the danger that local authorities efforts of data collection may be wasted, if the purposes for which they are collected are not made clear from the outset. The examination of the contents of datasets, prior to their selection must also be considered.

The 1991 Census count of total residential dwellings was slightly lower than that from the local authority in this study. This was the opposite pattern to that reported at the national level. Simpson and Dorling (1994) reported that the 1991 Census count of dwelling stock was much higher than expected by the DETR (Chapter 2 – Section 2.6.4). The CVS report however, concluded that 'the net undercoverage of dwellings was 126,000' and that '117,000 of these were in residential buildings that had been missed by the Census' (Heady et. al., 1994). Simpson and Dorling (1994) also reported that the 1991 Census vacancy figures were lower than expected by the DETR. The same pattern of lower Census vacancy figures was also found in Newcastle-upon-Tyne, which was found to be mainly due to definitional differences. The opposite pattern of Census excess of vacancies was observed in Benwell and Scotswood, because the Census figure included vacancies awaiting demolition and not in the housing market (OPCS/GRO(S), 1992). The 1991 Census vacancy definition also included vacancies in small hotel or boarding houses (which are tabulated separately as communal establishments) due to their tendency to move in and out of the housing market (OPCS/GRO(S), 1992; 24). The resulting Census excess of vacancies (in comparison with the local authority data) could reduce the total number of local authority dwellings available for relet, and be translated into less funding from the central government. A recent example of such concerns was those expressed by Westminster City Council regarding the ONS methodology and its contribution to errors in the 2001 Census. This authority has 'formally asked the Government for an independent review of the 2001 census in the borough' and claimed that 'incorrectly low population figures could lead to tens of millions of pounds of cuts to local authority budgets' (Milward, 2002). Newcastle City Council expressed similar concerns in the 1991 Housing Annual report. They quoted £591 as the amount of funds that were allocated to the authority per dwelling, per annum. They also noted the large difference between this and the available funding for dwellings in Westminster:

'... in the financial year 1991/92 the national allowance for Newcastle is £591 per dwelling per annum compared with, for example, Westminster whose national management and maintenance allowance is £1,736 per dwelling per annum'.

(Housing Annual Report, 1991)

The Census excess of vacancies in Benwell and Scotswood, found in this study, also illustrated the concerns about national versus local estimates of housing need (Niner, 1989; Simpson and Dorling, 1994). The Census vacancy definition resulted in higher numbers of Census vacancies (1119) compared to the local authority figure (331) in these Wards. This in turn would result in lower stock figures (available for relet) and higher housing need estimates, if the methods employed for the calculation of housing need by local authorities, took vacancies into account. This also illustrates how local housing needs estimates, calculated using local authority data, could significantly differ from those produced by the Census at the national level.

Local analysis of vacancy figures used information about dwellings' structure presented in table SAS61. Tenure information relating to vacant dwellings however, was found to be incomplete in the Census tables. Despite the presence of these categories, local authority owned vacant dwellings were not available from the 1991 Census. This meant that local authority rented vacant dwellings and total local authority stock could not be compared to the figures available from the local authority datasets. If the potential benefits of local authority administrative data for policy purposes or Census preparatory work are to be fully explored more detailed information about vacancies will be needed.

Information about vacant accommodation could be significantly improved if non-Census information were used in preparation for Census enumeration procedures. Information about local authority vacancies could be obtained from the departments responsible for housing, planning and council tax. Housing association vacancy information could be obtained from the individual Housing Associations or the Continuous Recording of new lettings and sales (CORE) data collected for the Housing Corporation. Combining figures from these disparate datasets however, as shown in this study, is subject to detailed data interpretation and resolving definitional differences. The 'differences of interpretation between housing associations and housing authorities' (Pawson et al., 1997) has been noted as one of the difficulties faced by the housing managers. Especially, when measuring vacancy numbers and performance in the management of vacant or difficult to let properties (Pawson et al., 1997). This national strategy for neighbourhood renewal report on unpopular housing also noted that 'the more quantitative studies are based on different definitions and

methodologies and thus offer a range of disparate figures on the scale and distribution of the problem'(DETR, 1999a).

Fielder and Smith (1996) note the limited amount of information about vacancies in the private sector, and name the 1991 Census (905,000), the EHCS (639,000) and the local authority HIPs returns (749,000) as the three national sources of data for vacancies in 1991. The authors also note that the varied estimates (with 42% difference between the highest and the lowest figures) were due to the different data compilation methods used in each of these source. Incomplete information about vacant properties, especially those in the private sector, has also been acknowledged by the DTLR (the then DETR). This has been through initiatives such as the empty homes strategy, the Empty Homes Agency, Best Value and low demand research projects as part of the neighbourhood renewal strategy. DETR have encouraged local authorities to 'develop empty homes strategies through Housing Investment Programme' (DETR, 2000a). The Government have also funded the 'Empty Homes Agency' (set up in 1992), 'to highlight the scale of the problem and seek innovative solutions' (DETR, 2000a). The agency collects information about vacancies from private property owners, local and central government, housing associations, local campaign groups and members of the public. The interest on the number of vacant properties has also increased through the introduction of one of Government's Best value Performance indicators. This requires local authorities to provide the number of privately owned vacant dwellings, which have been brought back into use. Reusing existing stock is encouraged, as it is considered less expensive than building new properties (DETR, 2000a). The analysis of Census and non-Census vacant dwelling figures, as illustrated in this study, can also be incorporated within low demand studies. The growing interest in such studies was highlighted in the national strategy for neighbourhood renewal report (DETR, 1999a) on unpopular housing. Analysis such as these further re-iterate the need for precise and comparable data, which can also be used as indicators of initiatives' success and progress.

8.4 Limitations of the present study

The study explained the differences in dwelling counts in Newcastle-upon-Tyne at scales finer that those used in previous investigations. Obtaining apparently simple

counts of total residential stock or total council stock from each of these sources was found to be unexpectedly difficult. The local authority figures were found to be different depending on the sources from which they originated. The routine nature of functions carried out within individual departments meant that in practice, data sharing was rare. This resulted in the large amount of data cleaning, georeferencing and interpreting the datasets, which consumed more time than expected. There were also problems found with Census data. Vacant dwelling figures categorised by tenure were not provided in Census table LBS64 and components of basic variables were dispersed among several Census tables.

The 1991 housing benefit data was a partially complete database that included claimants as at end of March 1991. Due to the partially complete nature of this dataset however, the results were not considered reliable for drawing inferences. It was intended to use this database to investigate the underenumeration of residents at sub-district resolutions. This database was used to obtain the numbers of 20-34 year old males (used as part of the EwC project as an indicator for dwelling underenumeration), households with single female pensioners and the structure of households, in each Ward and ED. The differences in housing stock figures were then correlated with the number of imputed residents and 20-34 year old males. This was carried out in order to test the EwC assumptions at sub-district resolutions.

8.5 The 2001 Census and further implications of the thesis

The changes in the 2001 Census suggest that the problems encountered as part of data integration and interpretation in this study, together with the explanation of differences are applicable in the wider context of Census research. Recent advances in GIS technology and Census user skills were among the main reasons for the introduction of the many changes in the 2001 Census methodology (Martin, 2000). This was the first Census in the UK that incorporated GIS and administrative registers in the planning and checking procedures. A combination of the register-based system, as used in other countries, and the traditional Census taking procedures, using enumerators, were employed. In planning for the 2001 Census and as part of research into Census underenumeration, administrative data were investigated to assess 'whether they could be used to aid the estimation of the Census undercount' (Teague;

1999). The extensive Census planning stage concluded that 'it was highly unlikely that registers of sufficient 'quality' could be developed by 2001' (Teague, 1999). Despite these inadequacies, local authority administrative data can be used in preparation to Census taking procedures (Brown *et al.*, 1999). Targeting resources towards difficult to enumerate groups and areas was another of the new strategies in the 2001 Census. As illustrated in this study, the comparison of dwelling figures can highlight the areas with significant differences from the two sources. These areas were found to have similar characteristics with those more prone to Census underenumeration. In addition, the Census excess of vacancy counts in the City, was strongly correlated with EwC non-response adjustments. Data quality problems were also encountered in this study as part of data integration, when creating compatible datasets for use within GIS (Chapter 3). It was found however, that data interpretation problems formed an equally significant part of the difficulties of combining Census and local authority administrative data. These were brought about because of the inherent nature of the datasets and the varied definitions used by the two data sources. Incompatible definitions between the Census and government data were acknowledged by the changes in the 2001 Census. These included the improvement of 'the ability of users to compare Census data with other government sources of statistical information' (Teague, 1999). This involved the harmonisation of concepts and definitions used in the 2001 Census and the Government's SSA indicators (ONS, 2002a).

Administrative data was also used in the 'One Number Census' (ONC) project. This included a follow-up survey, namely the Census Coverage Survey (CCS) of around 300,000 households. The ONC project aimed to measure Census underenumeration and 'to provide a clearer link between the Census counts and the population estimates' (Brown *et al.*, 1999). In estimating the level of underenumeration, the number of households in the Census were compared to the address counts (used as an estimation of household numbers) in the sample taken by CCS (Dixie, 1999). Administrative data was used to help identify interviewer workloads and to create the Hard to Count Index (HTC) (Dixie, 1999). This index was used to assign (HTC) scores to EDs and the postcodes within them, depending on the degree of enumeration difficulty. Indicators of this were in the form of several variables found to be significant by the ONS and the EwC project (Brown *et al.*, 1999). The variables

included the percentages of imputed residents, the percentage of households in multiply occupied buildings and those in privately rented accommodation in each ED. In explaining the differences in dwelling figures in this study, a similar method of selecting area characteristics was used. This involved the investigation of population estimates, the 1991 Census underenumeration and the adjustment procedures carried out by the OPCS and the EwC project.

Other changes in the 2001 Census included minimising the burden on the public (Teague, 1999). The resident's 'Usual Address and Whereabouts on Census night' was not required from the residents, as this was obtained from Address-Point or from the enumerators. Another change in the 2001 Census was related to its methodology, where the areas for which the data was collected were different to those for which the data was outputted (Martin, 2000; Rees, 1995). Data was initially gathered for individual addresses within EDs, but presented for Output Areas (OAs). These were unit postcode boundaries, which were modified and joined together to create larger OAs. Thiessen polygons created around individual addresses within Address-Point (Martin, 2000) formed the basis for the final OAs. The polygons with the same postcode were then joined together to create larger postcode unit areas. These however, had boundaries that may have cut across several major roads for example. Postcode unit boundaries were therefore modified to accommodate for major roads and landmarks. The final OAs were created by joining these together, as the modified postcode unit areas themselves were not large enough to comply with the confidentiality laws. This final operation was carried out using Openshaw's (1977) Automated Zoning Procedure (AZP). The 2001 Census data was presented as the Census Area Statistics (CAS) and the more detailed Standard Tables. The process of explaining the differences in this study, also highlighted the problems of different boundaries used by the authority and the 1991 Census, and the resulting problems of integrating these datasets. The new output areas will provide the common framework required for the co-ordination of Census and non-Census data. Unit postcode areas were also considered in this study as the intermediate stage for the aggregation of individual local authority records into EDs, but were not found suitable (Chapter 3 – Section 3.3.6). This was because the selected unit postcode boundaries (GEOPLAN), were not based on the available address register (1995 Gazetteer) and did not always encompass the addresses with the same postcodes. This in turn resulted in the

misallocation of aggregate counts to EDs. In the 2001 Census this problem was eliminated as the postcode boundaries were specifically designed around individual addresses within Address-Point. As well as the changes in the methodology, there were also changes made to some of the 2001 Census definitions, which confirmed some of the observations made in this study. These included dwellings, communal establishments, and type of accommodation. The definition of dwellings in the 2001 Census was determined as those which did not meet the descriptions of a shared dwelling. A dwelling was no longer determined by accommodation type and access to the property, as in the 1991 Census. A shared dwelling was described as that which had:

' *accommodation type 'part of converted or shared house', not all the rooms (including bathroom and toilet, if any) are behind a door that only that household can use and there is at least one other such household space at the same address with which it can be combined to form a shared dwelling. If any of these conditions is not met, the household space forms an unshared dwelling.*'

(ONS, 2001)

Communal establishments in the 2001 Census were distinguished by their management methods rather than their catering facilities, that had been used previously in the 1991 Census. Other dwelling related changes were that the type of accommodation and self-containment information was provided by the householder rather than the combination of the enumerator and the householder. This was through two separate questions about tenure and landlord, which replaced the single question in the 1991 Census. Furnished and unfurnished privately rented dwellings in the UK (but not in Scotland) were no longer distinguished according to the revised 2001 Census definitions. Vacant dwellings were identified by an indicator that distinguished between occupied, second homes and vacant dwellings. Unlike the 1991 Census second and holiday homes were not distinguished in the 2001 Census.

The definition of student's usual residence was changed in the 2001 Census to their term-time address, if they were studying away from home. The students' basic details were enumerated 'at their home' or 'vacation' address (ONS/GRO(s), 2001). This together with the separate question on full-time students resolved the conflicting

definitions between the Census and the population estimates. In the 1991 Census, this had contributed to the underenumeration and the OPCS and the EwC student adjustments (Chapter 2 – Section 2.5.2). Areas with high numbers of student residents, also had higher non-response rates and in Benwell and Scotswood, greater Census shortfall of residential dwellings. This was suggested from the distribution patterns of student and non-response adjustments in the City (Chapter 5 - Section 5.6.4) and the correlation values between these and Census shortfall of residential dwellings in Benwell and Scotswood (Chapter 5 - Section 5.8.16). The new changes in the 2001 Census are likely to create some difficulties when comparisons are made with the 1991 Census and the previous Censuses. Comparisons with the 1991 Census were removed from the original version of the statistics tables as the complications became apparent (ONS, 2002b). The careful selection of comparable variables has been mentioned in a study investigating the problems of comparing successive Censuses with changing Census procedures and definitions. Martin, Dorling and Mitchell (2002) have discussed such problems, which include varying geographical areal units, changing variables, varing environmental factors (such as the introduction of the Community Charge in 1991) and Census data access mechanisms. The solutions to these problems, in respect of each of these categories, have been given as 'streamlined access to censuses from 1971 to 1991 incorporating a range of areal units; careful selection of comparable variables; correction of 1991 counts, and web-based delivery of data from a single entry point' (Martin et al., 2002). Although in the 2001 Census the national non-response was similar to the previous Census (1.2 million), the proportion of people that returned their forms (94%) was less than that in 1991 (96%). The national response rate (98%) included those (4%) that were added by the follow-up survey (ONS, 2002). In Newcastle, the 2001 Census response rate was lower still (91%) in comparison with both the national rate (94%) and the average response rate in Tyne and Wear (95%).

8.6 Future research

Further investigation of Census underenumeration at the local scale could include extended ED profiles with additional information about households and residents. Subject to availability, this information may be obtained from archived resident related datasets in authorities around the time of the 1991 Census. These could

include the housing benefit data or the electoral register. In preparation for future investigations of Census underenumeration local authorities could download datasets, on or close to the time of Census. These could later be used for analysis with the Census information. The pre-requisite however, must be the clarification of policy objectives, terms and definitions, and the comparable variables to those from the Census.

The vacancy analysis could be extended to include details such as the reasons for vacancies, vacant households and the number of rooms. This would allow for the comparison of the results with those of the 1991 Post Census Survey of Vacant Property (PCVS) carried out by the Scottish Office in 1993. Such analysis was recently encouraged by the Government in order to help complete the necessary information about vacancies. Reusing vacant dwellings was suggested as the economic alternative to the provision of new housing. DETR also noted that 'bringing vacant dwellings back into use helps to maximise occupation of the existing housing stock and can reduce pressure to build on green field land and help to alleviate homelessness' (DETR, 2000a). Detailed investigation of vacancies could be incorporated within local housing need models, using national models and local authority datasets instead of Census data.

Individual ED analysis in this study was carried out using Access, Arcview and Excel. This analysis could be incorporated within a single computer programme/model, using a common programming language (e.g. Visual Basic) that incorporates figures from the local authority and the Census. Significant differences in selected variables could then be calculated between tenure, structure and occupancy groups. This could identify for example, that the differences were among occupied local authority owned terraced houses. The qualitative information from annual housing reports (e.g. various regeneration schemes in place) could also be incorporated in such a program helping to identify the reasons for large differences in selected areas. Based on a set of pre-defined criteria, areas with large differences due to Census underenumeration could then be better distinguished.

APPENDIX 1 - Council Properties database

This database was extracted from the Housing Property Information System (Table A1.1), and contained details of all council housing stock (39158 individual addresses as at 13/11/95).

PROPI	PROPRE	STREET	STREETN	STREETNAME	STAREA	ADDRESS1
44791	01360583	0136	136	ARMSTRONG		583
44792	01360585	0136	136	ARMSTRONG		585
3585	01370001	0137	137	ARMSTRONG	CALLER	1 ARMSTRONG
3588	01370004	0137	137	ARMSTRONG	CALLER	4 ARMSTRONG

HOUSEN	HNUMB	HNU	UPRN	EASTING	NORTHING
0583	583	583	001260583	420079	564132
0585	585	585	001260585	420079	564132
0001	1	1	001270001	417875	569017
0004	4	4	001270004	417859	569016

Table A1.1 Examples of records in the council properties database

Propid was a unique 6 digit property ID number, used in the Central Property Module (CPM), by all datasets on the housing mainframe. **Propref** was the Property Reference Number (8 digits), used by the Housing Department, which combined street (4 digits) and house numbers (4 digits). **Tenref** was the tenancy reference number (11 digits) used by the Housing Department comprising the street number (4 digits), house number (4 digits), Tenancy Sequence Number (2 digits) and 1 check digit. **Starea** was the area within which the property was located. **Address1** was the address format used in this and other files were not standardised. Spelling mistakes and varied address formats (e.g. 'St Johns road' versus 'Saint Johns road') caused difficulties in matching databases. **UPRN** was the Unique Property Reference Number originated from the Planning Department's property gazetteer and was used to link this file to the Gazetteer. This link was necessary to transfer information such as postcodes or grid references from the Gazetteer to the council properties database. Approximately 20% of the records in this file were updated with corresponding LPG UPRNs. **Easting and Northing** were 1 meter precision grid references from the LPG Gazetteer, present for 95% of records. The remainder were referenced using the O.S. Land-line maps within Arcview. **Streetname, Housenum, Hnumber, hnum** were added for address matching purposes.

APPENDIX 2 - Demolished/Sold council properties –Dataset structure

Records of council properties that were demolished, sold or transferred to housing associations (since 1990) were obtained from the Housing Renewal section of the Housing Department in a form of a database file (labelled as the old properties database). A section of this database is provided below.

STATUS	DATE	ID	STREETNAME	STAREA	TENREF	STREET	HOUSENO
07	19921019	44464	ABERCORN ROAD		00030049	3	0049
06	19900606	48919	ACANTHUS AVENUE		00080044	8	0044
06	19900412	48898	ACANTHUS AVENUE		00080002	8	0002
07	19951005	48917	ACANTHUS AVENUE		00080040	8	0040
07	19930407	48918	ACANTHUS AVENUE		00080042	8	0042
06	19951113	48884	ACANTHUS AVENUE		00080081	8	0081
06	19900810	67100	ACOMB GARDENS		00100034	10	0034

SCHEMENAME	RTBDATE	POSTCODE	EASTING	NORTHING
FERGUSONS LANE	0	NE15 6UL	420254	564341
FENHAM	0	NE4 9YD	421741	565082
FENHAM	0	NE4 9YD	421852	565035
IMPROVED FOR SALE	0	NE4 9YD	421740	565070
IMPROVED FOR SALE	0	NE4 9YD	421736	565178
FENHAM	0	NE4 9YE	421702	565149
BLACKETT ORD	0	NE5 2RY	421266	566009

Table A2.1 Examples of records in the 'old properties' database

STATUS field distinguished between demolished (code 07) or sold/transferred properties (code 06).

DATE referred to the property's change of status date. This was not necessarily the exact date, but that entered by the administrative staff when updating this database.

ID was the CPM property reference number

TENREF was the tenancy reference number

SCHEMENAME was the scheme under which the properties were disposed

RTBDATE was the Right to Buy date. This field was introduced in 1992 but did not include any information.

APPENDIX 3 - Land and Property Gazetteer

The 1995 LPG Gazetteer included both residential and business addresses (131072). This directory was used instead of the 'POSTZON' file, because the grid references were of a higher resolution (1m) that those in the 'POSTZON' file (100m). The total number of council properties in this gazetteer (51,000) did not however, reflect the number recorded in the council properties database (39158). This was because the process of updating this gazetteer was delayed until the completion of the transfer of planning department's records to their new GIS system.

UPRN	STREETNUM	HOUSENUM	HOUSENO	STREETNAME	EASTIN	NORTHING
0149500180001	1495	0018	18	GREY STREET	423317	572740
0151600280001	1516	0028	28	THE GROVE	424637	567575
0152600530000	1526	0053	53	HADDRICKS MILL	425472	567949
0161400110001	1614	0011	11	HAZLEMERE AVENUE	424720	570253
0165800010001	1658	0001	1	HENRY STREET	424240	568382
0165800010002	1658	0001	1	HENRY STREET	424240	568382

ADDRESS1	HSEADD2	ADDRESS2	ADDRESS3	ADDMATCH
GREY STREET	18	18A GREY STREET	BRUNSWICK	18 GREY STREET
SAVILLE HOUSE	28	28 THE GROVE	GOSFORTH	28 SAVILLE HOUSE
LYNFORD	53	53 HADDRICKS MILL ROAD	GOSFORTH	53 LYNFORD
HAZLEMERE AVENUE	11	11A HAZLEMERE AVENUE	MELTON PARK	11 HAZLEMERE
REGENT FARM COURT	1	1 HENRY STREET	GOSFORTH	1 REGENT FARM COURT
REGENT FARM COURT	2	2 HENRY STREET	GOSFORTH	2 REGENT FARM COURT

POSTCODE	PCODE	CODE
NE137DT	NE137DT	1
NE3 1PB	NE31PB	
NE3		1
NE3 5QL	NE35QL	1
NE3 1DQ	NE31DQ	2
NE3 1DQ	NE31DQ	2

Table A3.1 Example of records in the Land and PropertyGazetteer

UPRN was the Unique Property Reference Number used by the planning department to identify an individual property. It had 13 characters, consisting of streetnumber (5 characters), housenumber (4 characters), and flatnumber (4 characters). The Street number in this file was different to that in the council property file.

Easting, Northing Grid reference co-ordinates of each property, with 1 metre accuracy. (the postzone file has 100 metre grid references for each postcode).

Address1, Address2, Address3 contained the house/flat number and the streetname, followed by the main street name and area.

Postcode Some of the records have incomplete postcodes e.g. 'NE' or 'NE1'.

Code distinguished between private (1), council (2) and housing association (3).

Streetnum, Housenum, Houseno, Streetname, Houseadd2, Addmatch, Pcode

was a four digit number, used to identify street names. This was obtained from the Planning Department and added to the gazetteer.

were different formats (with and without leading zeros) of house number taken from the UPRN and 'Address1' fields.

was taken from the address1 field by copying the entire field into a new field and then removing the numerical digits from this field

Houseadd2 This field is the housenumber extracted from 'Address2' field, so it can later be used with other fields.

Combination of House number from field 'Address2' and the field 'Streetname'.

This was a duplicate of the 'Postcode' field with the central spaces taken out.

Adding CPM property reference numbers to the 1995 Gazetteer

In order to add additional information regarding dwelling structure, tenure and occupancy to the gazetteer, this was joined to other datasets that originated from the housing mainframe (in Arcview). In the absence of a common field, the partially complete LPG UPRN field and the combination of address and postcode fields were used to join the gazetteer to other datasets and transfer CPM property reference numbers to the gazetteer. In some cases addresses in the gazetteer and other datasets were matched using their grid co-ordinates. These were embedded in the shapefiles created from these datasets within Arcview. Despite using these various methods, some addresses could not be matched automatically and were assigned with CPM property references manually.

APPENDIX 4 - 1991 Vacant Properties Database – Structure

This database originated from records of properties from the old rates system and record of residents from the old Community Charge system. The database included CPM property ID number

PROPID	ADRESS111	ADDRESS2	PC1	C	DATE1	DATE2	EASTING	NORTHIN
000021	10_BEAUMON	BRUNSWICK	NE137	S	N6	N7	423099	572687
000118	THE BIG WATERS	BRUNSWICK	NE137	nu			423099	572687
000193	4 ROBERT ALLAN COURT	BRUNSWICK	NE137	N			423464	572802
000196	7 ROBERT ALLAN COURT	BRUNSWICK	NE137	nu			423464	572802
000207	18 ROBERT ALLAN COURT	BRUNSWICK	NE137	nu			423464	572802
000211	22 ROBERT ALLAN COURT	BRUNSWICK	NE137	S	11/1/91	29/5/91	423464	572802
000227	FLAT 5, 41 OSBORNE ROAD		NE22	S	20/12/90	3/4/92	425357	566171
000248	4 DARRELL STREET	BRUNSWICK	NE137	S	8/11/90	3/6/91	423337	572652

ADDMATCH	POSTDIST	GEOCODE	HOUSENUM	STREETNUM	UPRN1	EDCOD	CLAIMCO
	NE13	423099572687	10_BEAUMO	0239	0023900070000		0
	NE13	423099572687	THE	0239	0023900070000		0
	NE13	423464572802	4	0695	0069599990001		0
	NE13	423464572802	7	0695	0069599990001		0
	NE13	423464572802	18	0695	0069599990001		0
	NE13	423464572802	22	0695	0069599990001		0
OSBORNE ROAD	NE2	425357566171		2477	0247700410000		0
	NE13	423337572652		0952	0095200040000		0

Table A4.1 Examples of records in the 1991 vacant properties database

APPENDIX 5 - Variables in Ward and ED shapefiles

Shapefiles were created in order to contain figures from the Census and local authority data. The ED shapefile contained figures from Census SAS tables.

FIELD NAME	DESCRIPTION
EDCODE	6 digit Enumeration District ID number
CPROPS	**Housing** counts of existing council properties
OLDPROPS	**Housing** counts of Old council properties
SHELTERED	**Housing** counts of L.A sheltered accommodation
PROPS91	**Housing** counts of existing plus old L.A properties
EMPTY91	**Housing** counts of voids
Census SAS table 62	
DWELLINGS	**Census** counts of L.A. rented dwellings (with and without residents)
OWNED	**Census** owner occupied
BUYING	**Census** owner occupied
FURNISHED	**Census** rented privately
UNFURNISHED	**Census** rented privately
RENTWJOB	**Census** rented with a job or business
RENTHA	**Census** rented from a housing assocciation
TOTDWELLING	**Census** counts of all private and council dwellings (with and without residents)
DWELLNORES	**Census** counts of dwellings with persons enumerated but no usual residents
Census SAS table 61	
all occupancies	**Census** counts of all occupied, unoccupied and void dwellings
dwellings with residents	**Census** occupied dwellings with residents
CVOID91	**Census** counts of voids
Accom not used as main residence	**Census** accom without usual residents (no persons present + persons present but no residents)
no persons present	**Census** unoccupied, no persons present -second homes, holiday homes, student accom
persons present but no residents	**Census** occupied second homes, holiday homes, student accom e.g. visitors.
Estimating With Confidence Project	
CTOT	**Census counts of residents, all ages, used in EWC figures**
STUDADJ	**addition of** term-time students (home address elsewhere) **subtraction of** students resident elsewhere during term-time
TIMADJ	change between Census night and mid-1991
MODADJ	modification adjustment
ARMADJ	armed forces adjustment
NONR	residual non response
ALLADJ	all adjustments listed below
Calculated Fields	
GAZSUM95	**Housing** counts of all the properties in the gazetteer 95
DIFFALLD	Difference between the counts of Census 'all occupancies' and gazsum95
CV+2ND	**Census** counts of voids(cvoid91) and the counts of dwellings used as second residences, which were empty on Census night
CV2ND-HV	Difference between counts of Census voids(including vacant 2nd residences) and the housing counts of voids
CENSPPOR	Proportion of Census vacant dwellings(CV+2nd) from the total dwellings (total occupancies-sas61)
HSGPPOR	Proportion of housing vacant dwellings(empty91) from the total dwellings(gazsum95)
DIFFPPOR	Difference in the above proportions
DFALLDW%	Difference in number of all dwellings per ED, as a percentage of Census counts of all occupancies ((all occupancies - gazsum95)/all occupancies)*100

Table A5.1 Variables in the ED shapefile

Ward Shapefile

Fieldname	DESCRIPTION	SOURCE
cprops	**Housing** counts of existing council properties	agg Housing ed recs
oldprops	**Housing** counts of Old council properties	agg Housing ed recs
dwelling	**Census** counts of Local Authority rented dwellings	agg SAS62
sheltere	**Housing** counts of L.A sheltered accommodation	agg Housing ed recs
props91	**Housing** cprops plus old L.A props minus sheltered properties	Housing
empty91	**Housing** counts of voids	Housing
dwellnor	Census sas62, dwellings with persons enumerated but no residents	agg SAS62
cvoid	Census counts of voids-sas61	agg SAS61
gaz95sum	**Housing** counts of all the properties in the gazetteer 95	Housing
allocc64	Census counts of total dwellings of all occupancies	LBS64
diffocc	Difference in all dwellings (alloccupancies - gaz95sum)	LBS64
dwwres64	**Census** counts of dwellings with usual residents(LBS64)	LBS64
ooright	**Census** owner occupied	LBS64
buying	**Census** owner occupied	LBS64
furn	**Census** rented privately	LBS64
unfurn	**Census** rented privately	LBS64
rwj	**Census** rented with a job or business	LBS64
rwha	**Census** rented from a housing association	LBS64
rwla	**Census** counts of LA dwellings	LBS64
perenumn	**Census** counts of dwellings with persons enumerated but no usual residents 2 sub categories below:	LBS64
ownocc	1	LBS64
notownoc	2	LBS64
vacantac	**Census** vacant accommodation	LBS64
otheruno	**Census** other unoccupied accommodation	LBS64
STUDADJ	**addition of** term-time students (home address elsewhere) **subtraction of** students resident elsewhere during term-time	EWC
ARMADJ	armed forces adjustment	EWC
TIMADJ	change between Census night and mid-1991	EWC
MODADJ	modification adjustment	EWC
NONR	residual non response	EWC
ALLHVACS	**Housing** counts of vacant dwellings (including 2nd homes.)	Community Charge
ALLOCC61	**Census** counts of all occupied, unoccupied and void dwellings	LBS61
DWWRES61	**Census** counts of dwellings with usual residents(LBS61)	LBS61
ALLVACAN	**Census** counts of all vacant properties (excluding 2nd homes)	LBS61
VACNEWCE	**Census** counts of 'new' categroy voids	LBS61
VACUIMP	**Census** counts of 'under improvement' categroy voids	LBS61
VACOTHER	**Census** counts of 'Other' categroy voids	LBS61
NOTUSEDM	**Census** accom without usual residents (no persons present + persons present but no residents)	LBS61
NOPERSPR	**Census** unoccupied, no persons present,classified into 3 categories below:	LBS61
SECONDAC	**Census** second homes	LBS61
HOLACCOM	**Census** holiday homes	LBS61
STUDACCO	**Census** student accom	LBS61
PRESNORE	**Census** occupied second homes, holiday homes, student accom e.g. visitors.	LBS61
CV&2NDAC	**Census** counts of voids(cvoid91) and the counts of dwellings used as second residences, which were empty on Census night	Calculated
DIFFNALLV	Difference in all vacancies (Census-Housing)	Calculated

Table A5.2 Variables in the Ward shapefile

APPENDIX 6 - Structure of council properties

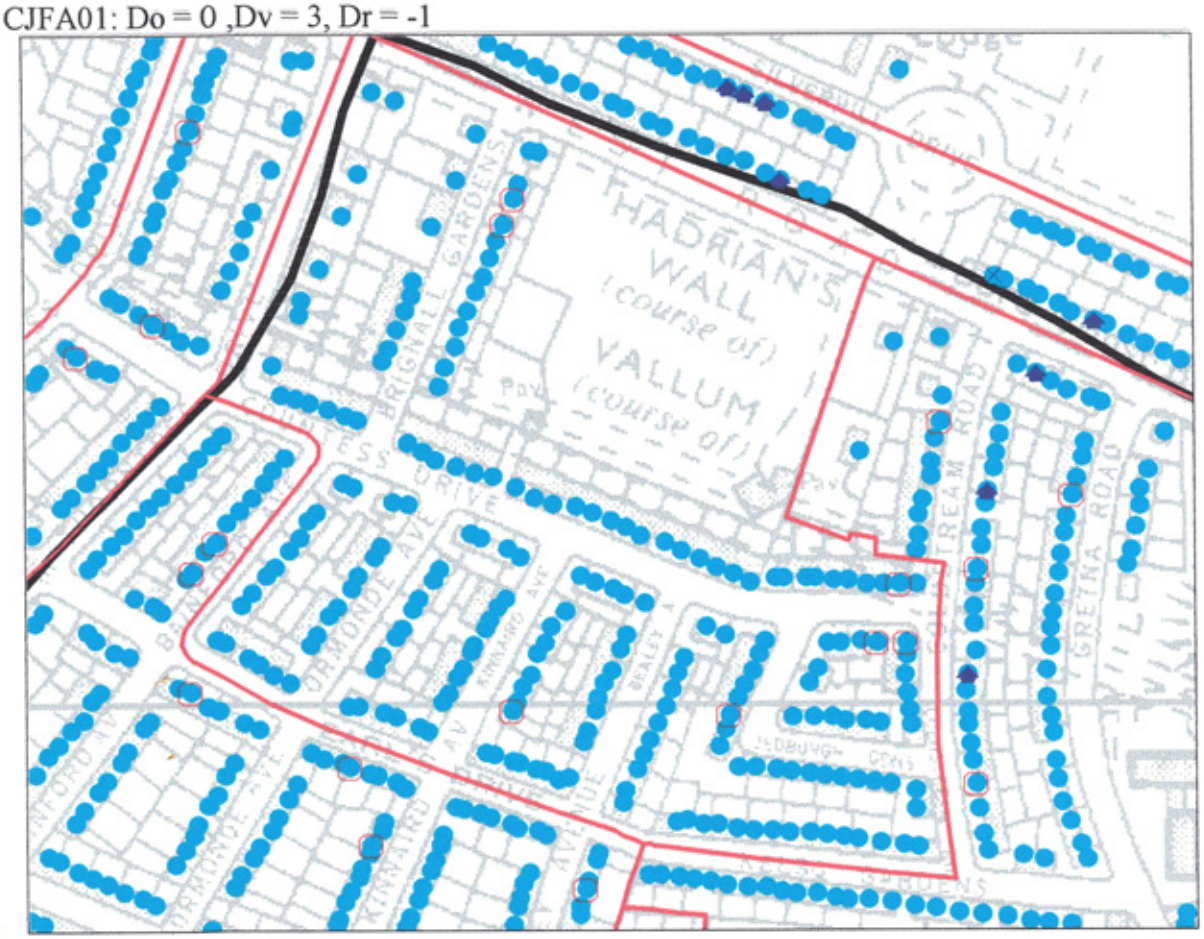
HOUSE NUMBER	STREET NUMBER	CPM ID	UNIT_TYPE	HORIZONTAL
0210	1524	140785	H	C
0SAL	1557	141751	H	D
0039	3139	088796	H	E
0037	1556	069542	H	M
0031	1556	069539	H	S
011A	3249	016837	F	C
014A	258	057275	F	D
0036	3538	133211	F	E
0038	3538	133212	F	M
0042	3538	133214	F	S
0086	3674	089459	B	D
0005	193	055923	B	E
0087	3809	073341	B	M
0007	4	067044	B	S
0008	4	067057	B	S
0036	3786	013252	M	E
0015	132	055771	M	M
0017	513	114272	M	S

Table A6.1 Structure of council properties database

The street number and the CPM ID number are those used by the Housing Mainframe system. The Unit type describes the accommodation's general structure, such as House (H), Flat (F), Bungalow (B) and Maisonette (M). The field named 'Horizontal' describes the horizontal position of the structure. For example a house is further described by clarifying whether it is located at middle, end or corner of a row of terraced houses and whether the accommodation is within a detached (D) or semi detached (S) structure.

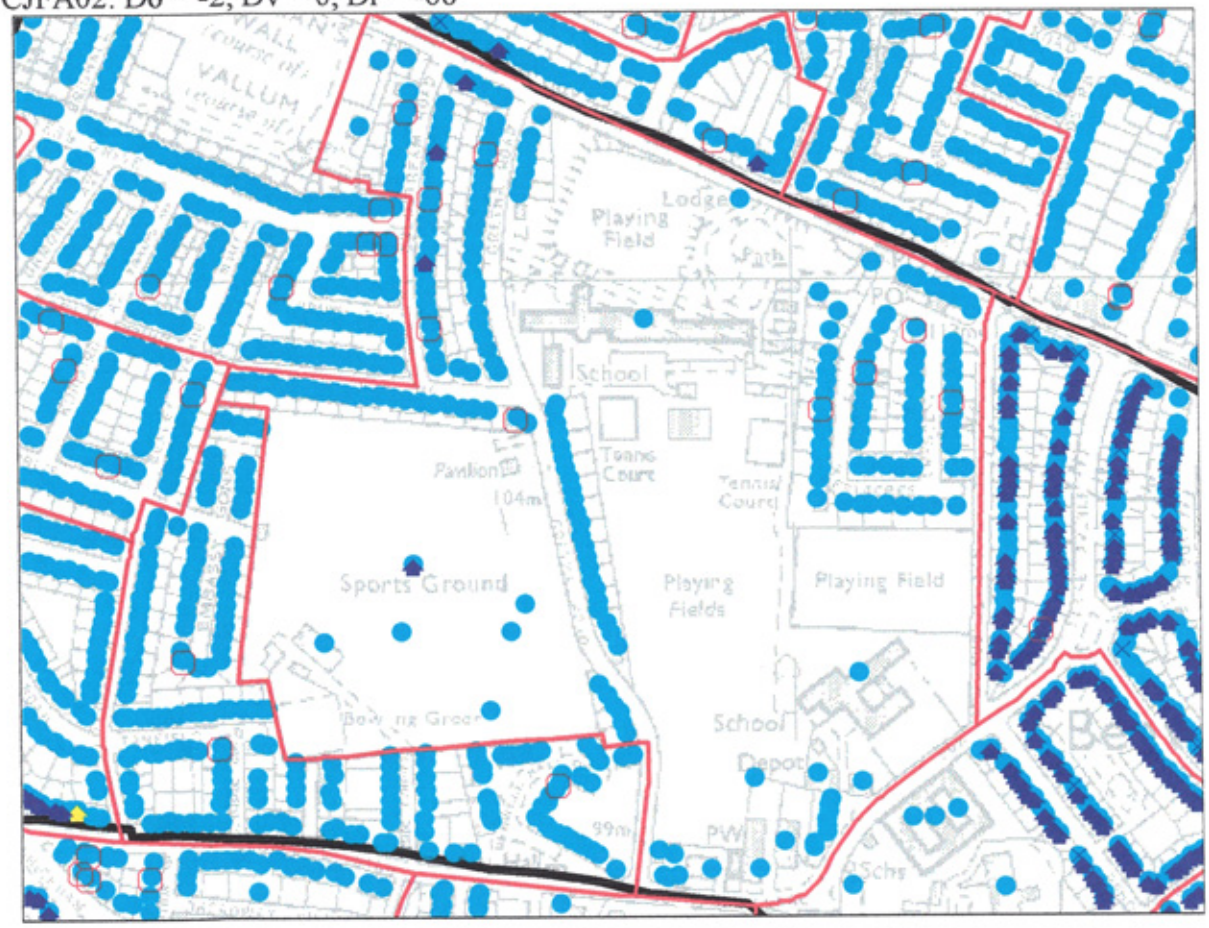
APPENDIX 7 - ED Profiles

CJFA01: Do = 0 ,Dv = 3, Dr = -1



Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	214	Residential addresses	215
			Business	1
			Unknown	0
			Total addresses	216
			Council properties	0
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.		1991 council stock	0
S610003	Detached	9	Bungalow	9
S610004	Semi Detached	205	House	204
S610005	Terraced	0	No Entry	1
S610006	Flat in res building	0	Flat	1
S610007	Flat in com. Building		Aged Persons Home	1
S610008	Converted. Flat			
S6100013	Shared Dwelling			
S610015 + S610071)/S620001	Dwellings with residents or visitors	204/205	Residential addresses – All vacancies	215-7 = 208
S620002	Owned outright	90		
S620003	Buying	111		
S620004	Furnished	0		
S620005	Un-furnished	2		
S620006	Rented with a job or business	2		
S620007	Rented from a Housing Association	0		
S620008	Rented from a local authority	0	1991 council stock – local authority vacancies	0
S610029 + S610057	Vacant dwellings and 2nd accom	10	All vacancies (Local authority vacancies)	7(0)
	Structure of vacant dwellings			
S610031 + S610059	Detached			
S610032 + S610060	Semi Detached	10	House	7
S610033 + S610061	Terraced			
S610034 + S610062	Flat in res. building			
S610036 + S610064	Converted Flat			

CJFA02: Do = -2, Dv = 0, Dr = -68

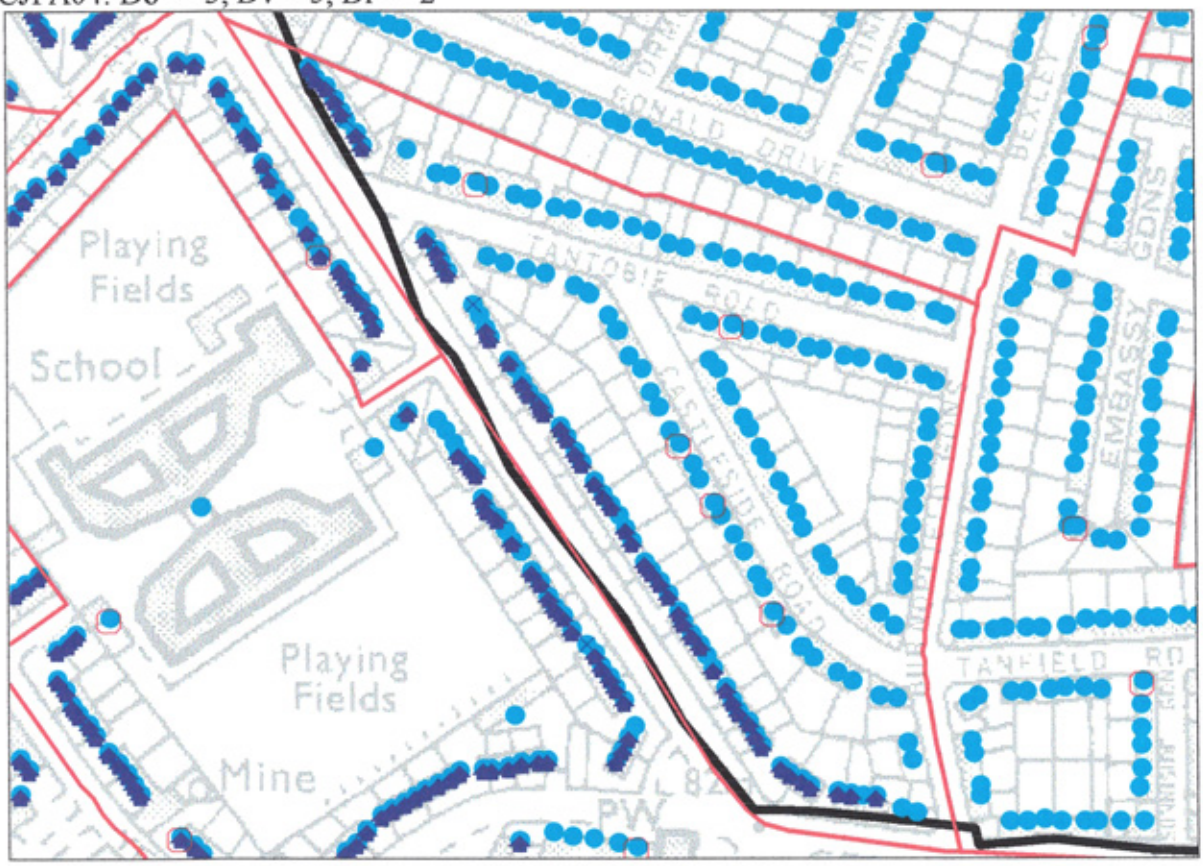


Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	194	Residential addresses	262
			Business	22
			Unknown	8
			Total addresses	292
			Council properties	4
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	2	1991 council stock	4
S610003	Detached	29	Bungalow	37
S610004	Semi Detached	159	House	220
S610005	Terraced	5	Public house & prem	1
S610006	Flat in res building			
S610007	Flat in Commercial Build.	1	Shop & prem.	1
S610008	Converted. Flat		School & premises	1
S6100013	Shared Dwelling		For cc purposes	1
			No Entry	31
S610015 + S610071)/S620001	Dwellings with residents or visitors	186/187	Residential addresses – All vacancies	292-9 = 283
S620002	Owned outright	71		
S620003	Buying	103		
S620004	Furnished	2		
S620005	Un-furnished	4		
S620006	Rented with a job or business	5		
S620007	Rented from a Housing Association	0		
S620008	Rented from a local authority	2	1991 council stock – local authority vacancies	4-0 = 4
S610029 + S610057	Vacant dwellings and 2nd accom	9	All vacancies (Local authority vacancies)	9 (0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	3	Bungalow	2
S610032 + S610060	Semi Detached	6	House	7
S610033 + S610061	Terraced			
S610034 + S610062	Flat in res. building			
S610036 + S610064	Converted Flat			

CJFA03: Do = 0, Dv = 3, Dr = 0

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	212	Residential addresses	212
			Business	1
			Unknown	
			Total addresses	213
			Council properties	0
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	0	1991 council stock	4
S610003	Detached	1	Bungalow	0
S610004	Semi Detached	211	House	212
S610005	Terraced		No Entry	1
S610006	Flat in res building			
S610007	Flat in Commercial Build.			
S610008	Converted. Flat			
S6100013	Shared Dwelling			
S610015 + S610071)/S620001	Dwellings with residents or visitors	201/202	Residential addresses – All vacancies	213-7 = 206
S620002	Owned outright	74		
S620003	Buying	124		
S620004	Furnished	0		
S620005	Un-furnished	4		
S620006	Rented with a job or business	0		
S620007	Rented from a Housing Association	0		
S620008	Rented from a local authority	0	1991 council stock – local authority vacancies	0
S610029 + S610057	Vacant dwellings and 2nd accom	10	All vacancies (Local authority vacancies)	7 (0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	10	House	7
S610033 + S610061	Terraced			
S610034 + S610062	Flat in res. building			
S610036 + S610064	Converted Flat			

CJFA04: Do = -3, Dv = 5, Dr = -2



Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	203	Residential addresses	205
			Business	2
			Unknown	0
			Total addresses	207
			Council properties	49
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	46	1991 council stock	49
S610003	Detached	1	Bungalow	0
S610004	Semi Detached	211	House	117
S610005	Terraced		No Entry	2
S610006	Flat in res building		Flat	88
S610007	Flat in Commercial Build.			
S610008	Converted. Flat			
S6100013	Shared Dwelling			
S610015 + S610071)/S620001	Dwellings with residents or visitors	194	Residential addresses – All vacancies	207-5 = 202
S620002	Owned outright	27		
S620003	Buying	83		
S620004	Furnished	8		
S620005	Un-furnished	27		
S620006	Rented with a job or business	2		
S620007	Rented from a Housing Association	1		
S620008	Rented from a local authority	46	1991 council stock – local authority vacancies	0
S610029 + S610057	Vacant dwellings and 2nd accom	10	All vacancies (Local authority vacancies)	5 (0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	2	House	0
S610033 + S610061	Terraced	1		
S610034 + S610062	Flat in res. building	7	flat	5
S610036 + S610064	Converted Flat			

CJFA05: Do = 4, Dv = 2, Dr = 0

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	211	Residential addresses	211
			Business	2
			Unknown	0
			Total addresses	213
			Council properties	0
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	4	1991 council stock	0
S610003	Detached	6	Bungalow	35
S610004	Semi Detached	142	House	126
S610005	Terraced	12	No Entry	2
S610006	Flat in res building	51	Flat	50
S610007	Flat in Commercial Build.			
S610008	Converted. Flat			
S6100013	Shared Dwelling			
S610015 + S610071)/S620001	Dwellings with residents or visitors	205	Residential addresses – All vacancies	213-3 = 210
S620002	Owned outright	47		
S620003	Buying	92		
S620004	Furnished	1		
S620005	Un-furnished	4		
S620006	Rented with a job or business	1		
S620007	Rented from a Housing Association	57		
S620008	Rented from a local authority	4	1991 council stock – local authority vacancies	0
S610029 + S610057	Vacant dwellings and 2nd accom	5	All vacancies (Local authority vacancies)	3 (0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	1	Bungalow	1
S610032 + S610060	Semi Detached	2	House	1
S610033 + S610061	Terraced	0		
S610034 + S610062	Flat in res. building	2	flat	1
S610036 + S610064	Converted Flat			

CJFA06: Do = 5, Dv = 0, Dr = 6

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	218	Residential addresses	212
			Business	3
			Unknown	0
			Total addresses	215
			Council properties	156
			Old council properties	2
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	162	1991 council stock	158
S610003	Detached	2	Bungalow	3
S610004	Semi Detached	29	House	189
S610005	Terraced	180	No Entry	2
S610006	Flat in res building	3	Flat	19
S610007	Flat in Commercial Build.		Caretaker's Accom	1
S610008	Converted. Flat	4	Show house	1
S6100013	Shared Dwelling			
S610015 + S610071)/S620001	Dwellings with residents or visitors	216	Residential addresses – All vacancies	215-2 = 213
S620002	Owned outright	13		
S620003	Buying	35		
S620004	Furnished	0		
S620005	Un-furnished	0		
S620006	Rented with a job or business	5		
S620007	Rented from a Housing Association	1		
S620008	Rented from a local authority	162	1991 council stock – local authority vacancies	158 – 1 = 157
	Vacant dwellings and 2nd accom	2	All vacancies (Local authority vacancies)	2 (1)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	0	House	0
S610033 + S610061	Terraced	2	Caretaker's Accom.	1
S610034 + S610062	Flat in res. building	0	flat	1

CJFA08: Do = -1, Dv = 22, Dr = -44

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	218	Residential addresses	214
			Business	0
			Unknown	0
			Total addresses	214
			Council properties	204
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	186	1991 council stock	204
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	132	House	184
S610005	Terraced	79	No Entry	0
S610006	Flat in res building	7	Flat	3
S610007	Flat in com. building	0	Rooms (Domestic)	27
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	214/213	Residential addresses – All vacancies	214-3 = 211
S620002	Owned outright	2		
S620003	Buying	10		
S620004	Furnished	1		
S620005	Un-furnished	0		
S620006	Rented with a job or business	3		
S620007	Rented from a Housing Association	11		
S620008	Rented from a local authority	186	1991 council stock – local authority vacancies	204 – 1 = 203
S610029 + S610057	Vacant dwellings and 2nd accom	3	All vacancies (Local authority vacancies)	3 (2)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	2	House	1
S610033 + S610061	Terraced	0	No Entry	0
S610034 + S610062	Flat in res. building	1	flat	1
S610036 + S610064	Converted Flat	0	Rooms(Domestic)	1

CJFA09: Do = -2, Dv = 8, Dr = 0

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	222	Residential addresses	222
			Business	11
			Unknown	1
			Total addresses	234
			Council properties	40
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	37	1991 council stock	40
S610003	Detached	2	Bungalow	24
S610004	Semi Detached	57	House	60
S610005	Terraced	22	No Entry	17
S610006	Flat in res building	128	Flat	131
S610007	Flat in com. building	11	Funeral parlour & premises	1
S610008	Converted. Flat	2	Public House & prem.	1
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	37	Residential addresses – All vacancies	40-1=39
S620002	Owned outright	10		
S620003	Buying	32		
S620004	Furnished	34		
S620005	Un-furnished	15		
S620006	Rented with a job or business	4		
S620007	Rented from a Housing Association	50		
S620008	Rented from a local authority	37	1991 council stock – local authority vacancies	234 – 30 = 204
S610029 + S610057	Vacant dwellings and 2nd accom	38	All vacancies (Local authority vacancies)	30 (1)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	6
S610032 + S610060	Semi Detached	7	House	1
S610033 + S610061	Terraced	0	No Entry	2
S610034 + S610062	Flat in res. building	30	flat	21
	Flat in com building	1		
S610036 + S610064	Converted Flat			

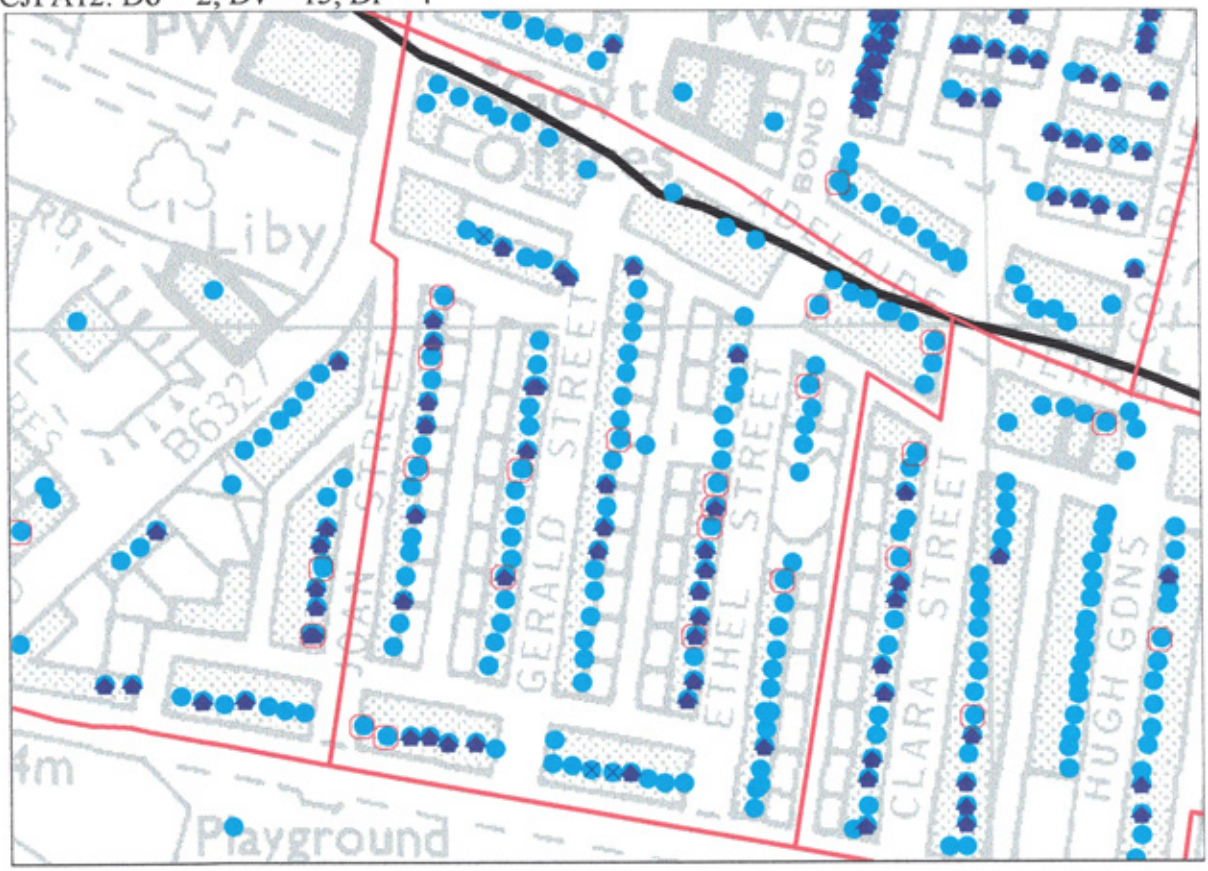
CJFA10: Do = 5, Dv = 0, Dr = 1

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	205	Residential	204
			Business	0
			Unknown	0
			Total addresses	204
			Council properties	1
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	6	1991 council stock	1
S610003	Detached	0	Bungalow	
S610004	Semi Detached	112	House	113
S610005	Terraced	0	No Entry	
S610006	Flat in res building	93	Flat	91
S610007	Flat in com. building	0		
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	37	Residential addresses – All vacancies	204- 3 = 201
S620002	Owned outright	40		
S620003	Buying	79		
S620004	Furnished	4		
S620005	Un-furnished	5		
S620006	Rented with a job or business	1		
S620007	Rented from a Housing Association	67		
S620008	Rented from a local authority	6	1991 council stock – local authority vacancies	1 – 0 = 1
S610029 + S610057	Vacant dwellings and 2nd accom	3	All vacancies (Local authority vacancies)	3(0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	
S610032 + S610060	Semi Detached	2	House	2
S610033 + S610061	Terraced	0	No Entry	
S610034 + S610062	Flat in res. building	1	flat	1
	Flat in com building			
S610036 + S610064	Converted Flat			

CJFA11: Do = 3 ,Dv = 2, Dr = 9

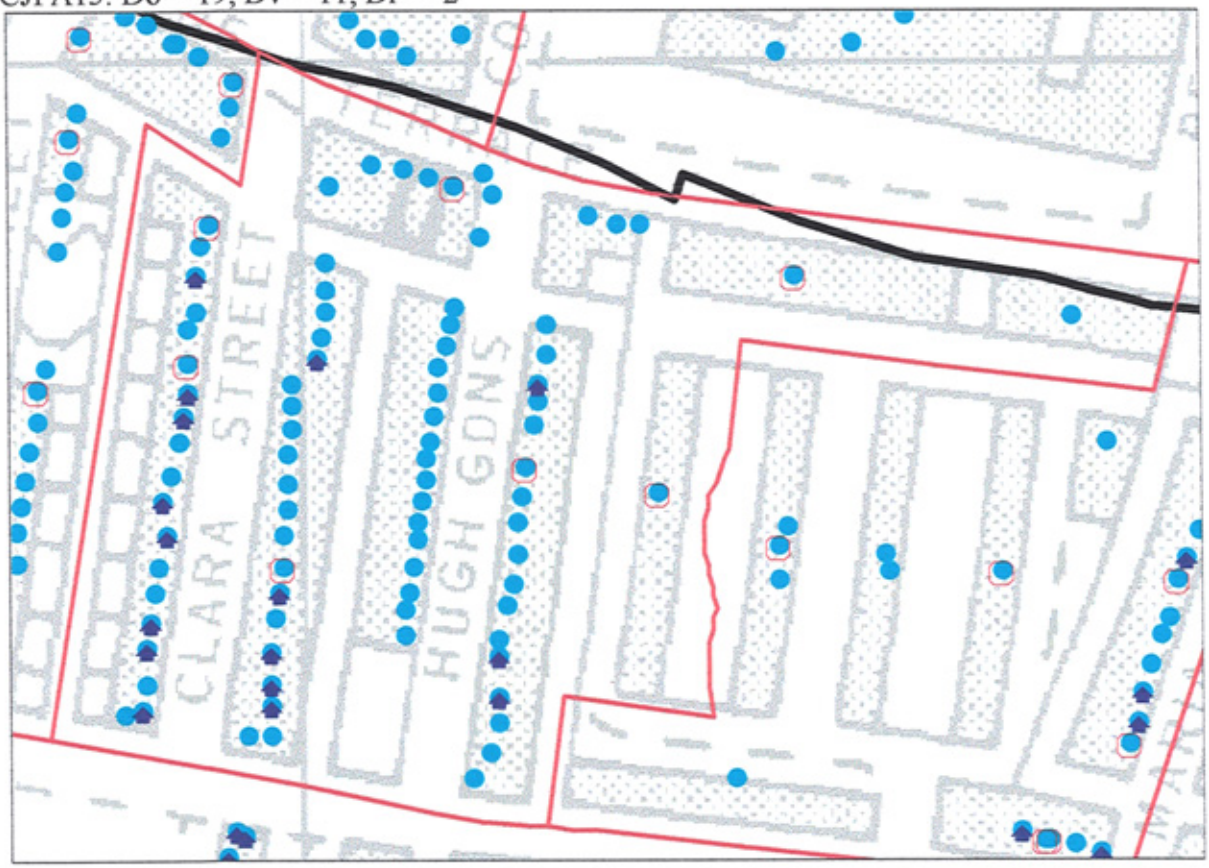
Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	218	Residential addresses	209
			Business	8
			Unknown	2
			Total addresses	219
			Council properties	26
			Old council properties	1
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	29	1991 council stock	27
S610003	Detached	2	Bungalow	0
S610004	Semi Detached	93	House	141
S610005	Terraced	53	No Entry	11
S610006	Flat in res building	69	Flat	66
S610007	Flat in com. building	1	Shop & premises	1
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	207/208	Residential addresses – All vacancies	219-5 = 214
S620002	Owned outright	36		
S620003	Buying	95		
S620004	Furnished	27		
S620005	Un-furnished	15		
S620006	Rented with a job or business	1		
S620007	Rented from a Housing Association	8		
S620008	Rented from a local authority	29	1991 council stock – local authority vacancies	27 – 1 = 26
S610029 + S610057	Vacant dwellings and 2nd accom	7	All vacancies (Local authority vacancies)	5 (1)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	3	House	2
S610033 + S610061	Terraced	2	No Entry	0
S610034 + S610062	Flat in res. building	2	flat	3
S610036 + S610064	Converted Flat	0		

CJFA12: Do = 2, Dv = 13, Dr = 4



Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	206	Residential addresses	202
			Business	33
			Unknown	11
			Total addresses	246
			Council properties	55
			Old council properties	3
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	56	1991 council stock	58
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	0	House	16
S610005	Terraced	18	No Entry	66
S610006	Flat in res building	166	Flat	162
S610007	Flat in com. building	5	Shop & premises	1
S610008	Converted. Flat	10	Rooms(Domestic)	1
	Converted Flatlet	4		
S6100013	Shared Dwelling	3		
S610015 + S610071)/S620001	Dwellings with residents or visitors	158/159	Residential addresses – All vacancies	246- 23 = 223
S620002	Owned outright	11		
S620003	Buying	26		
S620004	Furnished	39		
S620005	Un-furnished	25		
S620006	Rented with a job or business	0		
S620007	Rented from a Housing Association	14		
S620008	Rented from a local authority	56	1991 council stock – local authority vacancies	58 – 4 = 52
S610029 + S610057	Vacant dwellings and 2nd accom	36	All vacancies (Local authority vacancies)	23 (4)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	0	House	1
S610033 + S610061	Terraced	1	No Entry	5
S610034 + S610062	Flat in res. building	28	flat	17
	Flat in com building	3		
S610036 + S610064	Converted Flat	4		

CJFA13: Do = 19, Dv = 11, Dr = -2



Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	217	Residential addresses	219
			Business	10
			Unknown	3
			Total addresses	232
			Council properties	28
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	47	1991 council stock	28
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	0	House	23
S610005	Terraced	22	No Entry	97
S610006	Flat in res building	191	Flat	111
S610007	Flat in com. building	4	Maisonnette	1
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	190/191	Residential addresses – All vacancies	232-12 = 220
S620002	Owned outright	17		
S620003	Buying	18		
S620004	Furnished	21		
S620005	Un-furnished	30		
S620006	Rented with a job or business	2		
S620007	Rented from a Housing Association	59		
S620008	Rented from a local authority	47	1991 council stock – local authority vacancies	28 – 0 = 28
S610029 + S610057	Vacant dwellings and 2nd accom	23	All vacancies (Local authority vacancies)	12 (0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	0	House	1
S610033 + S610061	Terraced	2	No Entry	6
S610034 + S610062	Flat in res. building	19	flat	5
	Flat in com. building	2		

CJFA14: Do = -3, Dv = 9, Dr = 7

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	205	Residential addresses	198
			Business	3
			Unknown	8
			Total addresses	209
			Council properties	14
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	11	1991 council stock	14
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	2	House	3
S610005	Terraced	4	No Entry	63
S610006	Flat in res building	193	Flat	143
S610007	Flat in com. building	1		
S610008	Converted. Flat	5		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	179	Residential addresses – All vacancies	209-18 = 181
S620002	Owned outright	2		
S620003	Buying	0		
S620004	Furnished	13		
S620005	Un-furnished	5		
S620006	Rented with a job or business	0		
S620007	Rented from a Housing Association	148		
S620008	Rented from a local authority	11	1991 council stock – local authority vacancies	14 – 1 = 13
S610029 + S610057	Vacant dwellings and 2nd accom	27	All vacancies (Local authority vacancies)	18 (0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	1	Bungalow	0
S610032 + S610060	Semi Detached	1	House	0
S610033 + S610061	Terraced	21	No Entry	5
S610034 + S610062	Flat in res. building	9	flat	0
S610036 + S610064	Converted Flat	1	For cc purposes	13

CJFA15: Do = 10, Dv = 3, Dr = 13

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	210	Residential addresses	197
			Business	14
			Unknown	2
			Total addresses	213
			Council properties	89
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	94	1991 council stock	89
S610003	Detached	3	Bungalow	0
S610004	Semi Detached	5	House	51
S610005	Terraced	41	No Entry	17
S610006	Flat in res building	151	Flat	141
S610007	Flat in com. building	6	Cemetery & Premises	3
S610008	Converted. Flat	2	Shop & Premesis	1
S6100013	Shared Dwelling	2		
S610015 + S610071)/S620001	Dwellings with residents or visitors	186/185	Residential addresses – All vacancies	213-17 = 196
S620002	Owned outright	2		
S620003	Buying	0		
S620004	Furnished	13		
S620005	Un-furnished	5		
S620006	Rented with a job or business	0		
S620007	Rented from a Housing Association	148		
S620008	Rented from a local authority	94	1991 council stock – local authority vacancies	89 – 5 = 84
S610029 + S610057	Vacant dwellings and 2nd accom	20	All vacancies (Local authority vacancies)	17 (5)
	Structure of vacant dwellings			
S610031 + S610059	Detached		Bungalow	0
S610032 + S610060	Semi Detached		House	1
S610033 + S610061	Terraced		No Entry	
S610034 + S610062	Flat in res. building	18	flat	16
	Flat in com. building	1		
S610036 + S610064	Converted Flat	1		

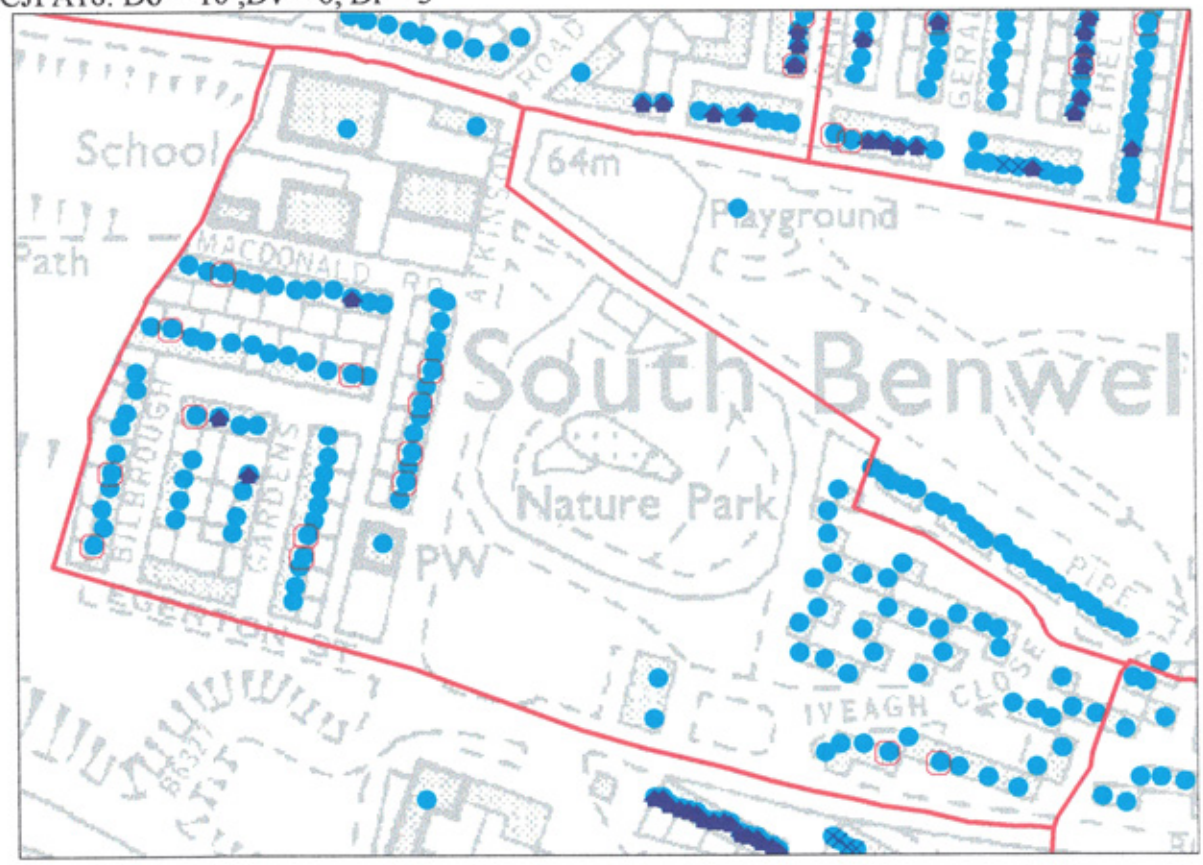
CJFA16: Do = -12, Dv = 5, Dr = 35

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	237	Residential addresses	202
			Business	0
			Unknown	4
			Total addresses	206
			Council properties	109
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	90	1991 council stock	109
S610003	Detached	2	Bungalow	0
S610004	Semi Detached	19	House	76
S610005	Terraced	61	No Entry	9
S610006	Flat in res building	155	Flat	121
S610007	Flat in com. building	0		
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	210/209	Residential addresses – All vacancies	206-26 = 180
S620002	Owned outright	7		
S620003	Buying	94		
S620004	Furnished	10		
S620005	Un-furnished	6		
S620006	Rented with a job or business	3		
S620007	Rented from a Housing Association	1		
S620008	Rented from a local authority	90	1991 council stock – local authority vacancies	90 – 7 = 91
S610029 + S610057	Vacant dwellings and 2nd accom	26	All vacancies (Local authority vacancies)	21(7)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	2	House	4
S610033 + S610061	Terraced	7	No Entry	1
S610034 + S610062	Flat in res. building	17	flat	16
S610036 + S610064	Converted Flat			

CJFA17: Do = -15, Dv = 8, Dr = -24

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	182	Residential addresses	206
			Business	66
			Unknown	1
			Total addresses	273
			Council properties	121
			Old council properties	6
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	102	1991 council stock	127
S610003	Detached	1	Bungalow	0
S610004	Semi Detached	0	House	102
S610005	Terraced	105	No Entry	105
S610006	Flat in res building	75	Flat	66
S610007	Flat in com. building	1		
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	164/163	Residential addresses – All vacancies	273-10 = 263
S620002	Owned outright	3		
S620003	Buying	47		
S620004	Furnished	9		
S620005	Un-furnished	0		
S620006	Rented with a job or business	3		
S620007	Rented from a Housing Association	0		
S620008	Rented from a local authority	102	1991 council stock – local authority vacancies	127 – 10 = 117
S610029 + S610057	Vacant dwellings and 2nd accom	18	All vacancies (Local authority vacancies)	10 (10)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	0	House	5
S610033 + S610061	Terraced	12	No Entry	0
S610034 + S610062	Flat in res. building	6	flat	5
S610036 + S610064	Converted Flat	0		

CJFA18: Do = 10 ,Dv = 6, Dr = 3



Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	206	Residential addresses	203
			Business	6
			Unknown	4
			Total addresses	213
			Council properties	4
			Old council properties	6
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	16	1991 council stock	6
S610003	Detached	1	Bungalow	0
S610004	Semi Detached	3	House	26
S610005	Terraced	19	No Entry	15
S610006	Flat in res building	181	Flat	170
S610007	Flat in com. building	2	Maisonnette	1
S610008	Converted. Flat	0	School & prem.	1
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	184/182	Residential addresses – All vacancies	213-16 = 197
S620002	Owned outright	11		
S620003	Buying	27		
S620004	Furnished	30		
S620005	Un-furnished	1635		
S620006	Rented with a job or business	2		
S620007	Rented from a Housing Association	64		
S620008	Rented from a local authority	16	1991 council stock – local authority vacancies	6 – 0 = 6
S610029 + S610057	Vacant dwellings and 2nd accom	22	All vacancies (Local authority vacancies)	16 (0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	
S610032 + S610060	Semi Detached	0	House	
S610033 + S610061	Terraced	0	No Entry	1
S610034 + S610062	Flat in res. building	22	flat	15
S610036 + S610064	Converted Flat	0		

CJFA19: Do = 10 ,Dv = 1, Dr = 14

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	206	Residential addresses	192
			Business	0
			Unknown	0
			Total addresses	192
			Council properties	161
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	170	1991 council stock	161
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	0	House	55
S610005	Terraced	79	No Entry	0
S610006	Flat in res building	127	Flat	137
S610007	Flat in com. building	0		
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	204	Residential addresses – All vacancies	206-1 = 205
S620002	Owned outright	0		
S620003	Buying	0		
S620004	Furnished	1		
S620005	Un-furnished	0		
S620006	Rented with a job or business	2		
S620007	Rented from a Housing Association	2		
S620008	Rented from a local authority	170	1991 council stock – local authority vacancies	161 – 1 = 160
S610029 + S610057	Vacant dwellings and 2nd accom	2	All vacancies (Local authority vacancies)	1 (1)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	0	House	0
S610033 + S610061	Terraced	0	No Entry	0
S610034 + S610062	Flat in res. building	2	flat	1
S610036 + S610064	Converted Flat	0		0

CJFA20: Do = 23, Dv = 2, Dr = -2

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	205	Residential addresses	207
			Business	5
			Unknown	0
			Total addresses	212
			Council properties	88
			Old council properties	2
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	99	1991 council stock	90
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	0	House	69
S610005	Terraced	92	No Entry	49
S610006	Flat in res building	113	Flat	92
S610007	Flat in com. building	0	Maisonnette	1
S610008	Converted. Flat	0	Shop & prem.	1
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	144	Residential addresses – All vacancies	212-59 = 153
S620002	Owned outright	0		
S620003	Buying	0		
S620004	Furnished	0		
S620005	Un-furnished	8		
S620006	Rented with a job or business	2		
S620007	Rented from a Housing Association	35		
S620008	Rented from a local authority	99	1991 council stock – local authority vacancies	90 – 14 = 76
S610029 + S610057	Vacant dwellings and 2nd accom	61	All vacancies (Local authority vacancies)	59 (14)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	0	House	19
S610033 + S610061	Terraced	32	No Entry	25
S610034 + S610062	Flat in res. building	29	flat	14
S610036 + S610064	Converted Flat		Shop & prem.	1

CJFA21: Do = 30, Dv = 3, Dr = 1

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings		Residential addresses	210
			Business	0
			Unknown	1
			Total addresses	211
			Council properties	42
			Old council properties	57
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	87	1991 council stock	99
S610003	Detached	0	Bungalow	8
S610004	Semi Detached	2	House	42
S610005	Terraced	59	No Entry	70
S610006	Flat in res building	150	Flat	91
S610007	Flat in com. building	0	Maisonnette	0
S610008	Converted. Flat	0	Shop & prem.	0
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	90/91	Residential addresses – All vacancies	211-118 = 93
S620002	Owned outright	2		
S620003	Buying	1		
S620004	Furnished	0		
S620005	Un-furnished	1		
S620006	Rented with a job or business	0		
S620007	Rented from a Housing Association	0		
S620008	Rented from a local authority	87	1991 council stock – local authority vacancies	99-42=57
S610029 + S610057	Vacant dwellings and 2nd accom	121	All vacancies (Local authority vacancies)	118 (42)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	3
S610032 + S610060	Semi Detached	0	House	4
S610033 + S610061	Terraced	7	No Entry	46
S610034 + S610062	Flat in res. building	114	flat	65
S610036 + S610064	Converted Flat		Shop & prem.	

CJFU01: Do = 0, Dv = 1, Dr = -3

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	165	Residential addresses	168
			Business	
			Unknown	40
			Total addresses	208
			Council properties	0
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	0	1991 council stock	0
S610003	Detached	1	Bungalow	1
S610004	Semi Detached	164	House	163
S610005	Terraced	0	No Entry	43
S610006	Flat in res building	0	Flat	0
S610007	Flat in com. building	0	House-Store shed	1
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	158	Residential addresses – All vacancies	208-6 = 202
S620002	Owned outright	96		
S620003	Buying	1		
S620004	Furnished	4		
S620005	Un-furnished	1		
S620006	Rented with a job or business	0		
S620007	Rented from a Housing Association	0		
S620008	Rented from a local authority	0	1991 council stock – local authority vacancies	0
S610029 + S610057	Vacant dwellings and 2nd accom	7	All vacancies (Local authority vacancies)	6 (0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	7	House	6
S610033 + S610061	Terraced	0	No Entry	0
S610034 + S610062	Flat in res. building	0	flat	0
S610036 + S610064	Converted Flat	0		0

CJFU02: Do = -2 ,Dv = -7, Dr = -2

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	193	Residential addresses	195
			Business	26
			Unknown	4
			Total addresses	225
			Council properties	15
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	12	1991 council stock	15
S610003	Detached	193	Bungalow	10
S610004	Semi Detached	4	House	161
S610005	Terraced	162	No Entry	26
S610006	Flat in res building	5	Flat	20
S610007	Flat in com. building	14	Home for Ph.Hand	1
S610008	Converted. Flat	8	Office & Premises	1
S6100013	Shared Dwelling	0	Shop & Premises	3
S610015 + S610071)/S620001	Dwellings with residents or visitors	204	Residential addresses – All vacancies	206-1 = 205
S620002	Owned outright	58		
S620003	Buying	98		
S620004	Furnished	8		
S620005	Un-furnished	7		
S620006	Rented with a job or business	0		
S620007	Rented from a Housing Association	6		
S620008	Rented from a local authority	12	1991 council stock – local authority vacancies	15 – 1 = 14
S610029 + S610057	Vacant dwellings and 2nd accom	4	All vacancies (Local authority vacancies)	11 (1)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	0	House	5
S610033 + S610061	Terraced	0	No Entry	2
S610034 + S610062	Flat in res. building	1	flat	3
S610036 + S610064	Converted Flat	3	Office & Premises	1

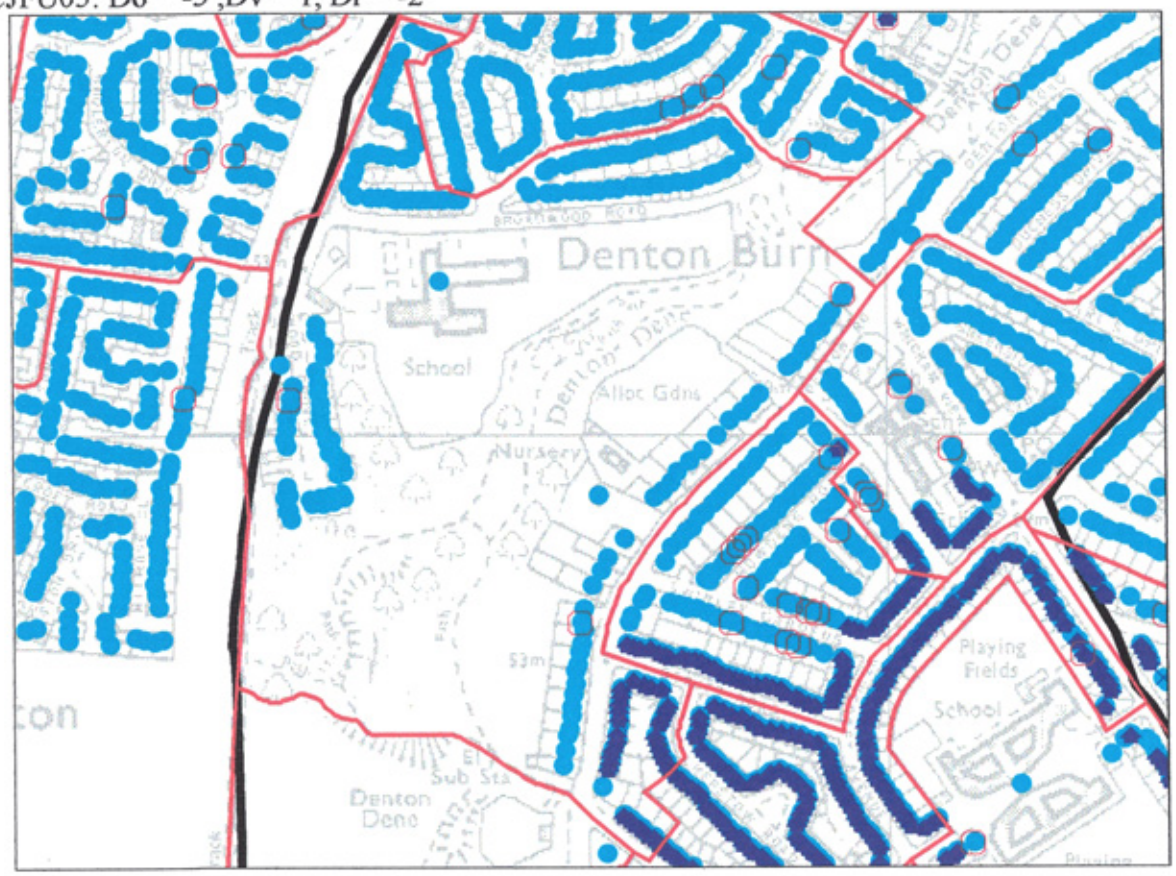
CJFU03: Do = -4, Dv = 2, Dr = 1

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	212	Residential addresses	211
			Business	12
			Unknown	0
			Total addresses	223
			Council properties	21
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	17	1991 council stock	21
S610003	Detached	4	Bungalow	3
S610004	Semi Detached	125	House	157
S610005	Terraced	30	No Entry	12
S610006	Flat in res building	51	Flat	49
S610007	Flat in com. building	2	Maisonnette	1
S610008	Converted. Flat	0	Shop & Premises	1
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	201/200	Residential addresses – All vacancies	223-8 = 215
S620002	Owned outright	54		
S620003	Buying	97		
S620004	Furnished	9		
S620005	Un-furnished	19		
S620006	Rented with a job or business	6		
S620007	Rented from a Housing Association	1		
S620008	Rented from a local authority	17	1991 council stock – local authority vacancies	21 – 0 = 21
S610029 + S610057	Vacant dwellings and 2nd accom	10	All vacancies (Local authority vacancies)	8 (0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	1	House	4
S610033 + S610061	Terraced	0	No Entry	2
S610034 + S610062	Flat in res. building	6	flat	2
S610036 + S610064	Converted Flat	0		0

CJFU04: Do = 0, Dv = 0, Dr = -1

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	206	Residential addresses	207
			Business	1
			Unknown	0
			Total addresses	208
			Council properties	0
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	0	1991 council stock	0
S610003	Detached	1	Bungalow	0
S610004	Semi Detached	205	House	207
S610005	Terraced	0	No Entry	1
S610006	Flat in res building	0	Flat	0
S610007	Flat in com. building	0		
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	201	Residential addresses – All vacancies	208-3 = 205
S620002	Owned outright	86		
S620003	Buying	107		
S620004	Furnished	5		
S620005	Un-furnished	3		
S620006	Rented with a job or business	0		
S620007	Rented from a Housing Association	0		
S620008	Rented from a local authority	0	1991 council stock – local authority vacancies	0
S610029 + S610057	Vacant dwellings and 2nd accom	6	All vacancies (Local authority vacancies)	6 (0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	6	House	6
S610033 + S610061	Terraced	0	No Entry	0
S610034 + S610062	Flat in res. building	0	flat	0
S610036 + S610064	Converted Flat	0		0

CJFU05: Do = -3 ,Dv = 1, Dr = -2

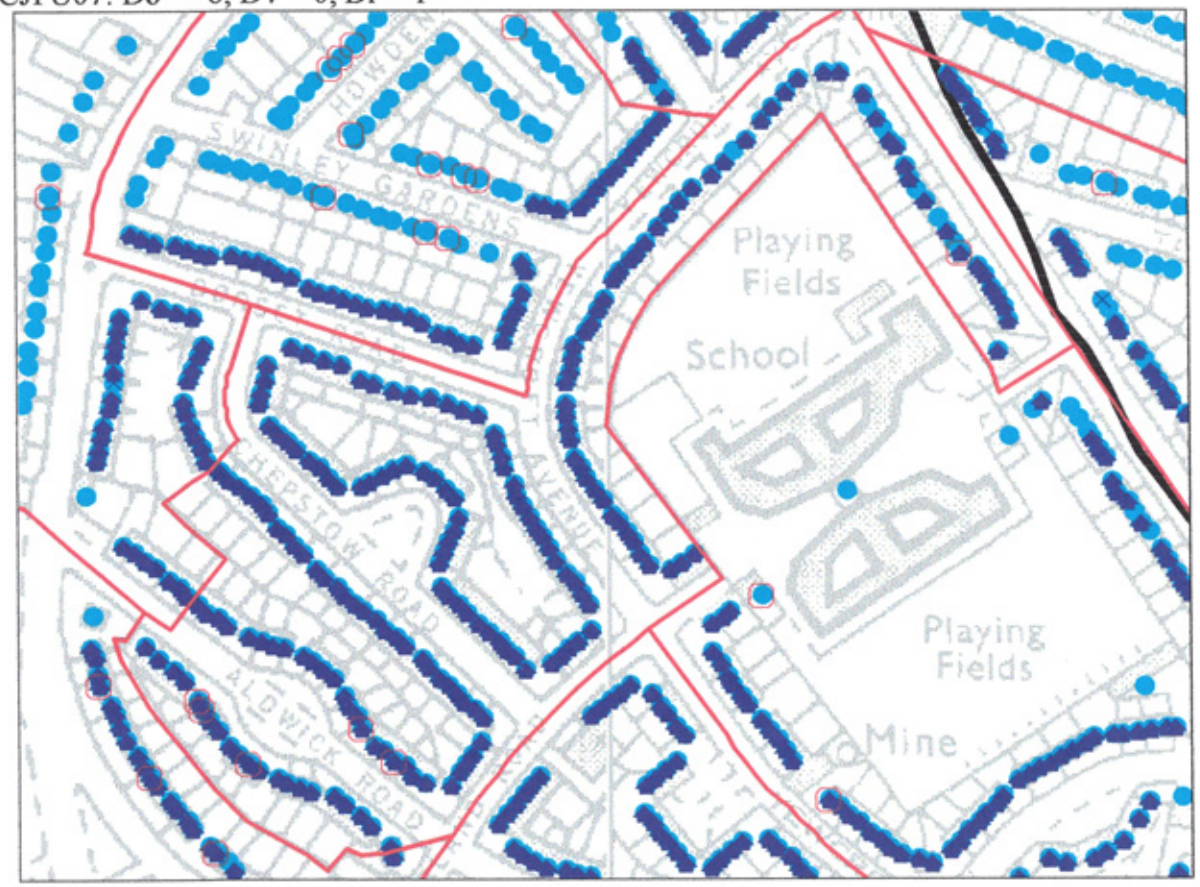


Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	192	Residential addresses	194
			Business	4
			Unknown	10
			Total addresses	208
			Council properties	32
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	29	1991 council stock	32
S610003	Detached	16	Bungalow	8
S610004	Semi Detached	111	House	150
S610005	Terraced	33	No Entry	15
S610006	Flat in res building	32	Flat	32
S610007	Flat in com. building	0	Bank & Prem	1
S610008	Converted. Flat	0	School & Prem	1
S6100013	Shared Dwelling	0	House, Garage, Kennels & prem.	1
S610015 + S610071)/S620001	Dwellings with residents or visitors	190/189	Residential addresses – All vacancies	208-3 = 205
S620002	Owned outright	35		
S620003	Buying	111		
S620004	Furnished	5		
S620005	Un-furnished	6		
S620006	Rented with a job or business	1		
S620007	Rented from a Housing Association	2		
S620008	Rented from a local authority	29	1991 council stock – local authority vacancies	32 – 0 = 32
S610029 + S610057	Vacant dwellings and 2nd accom	4	All vacancies (Local authority vacancies)	3 (0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	2	House	2
S610033 + S610061	Terraced	2	No Entry	1
S610034 + S610062	Flat in res. building	0	flat	0
S610036 + S610064	Converted Flat	0		0

CJFU06: Do = -2 ,Dv = 5, Dr = 2

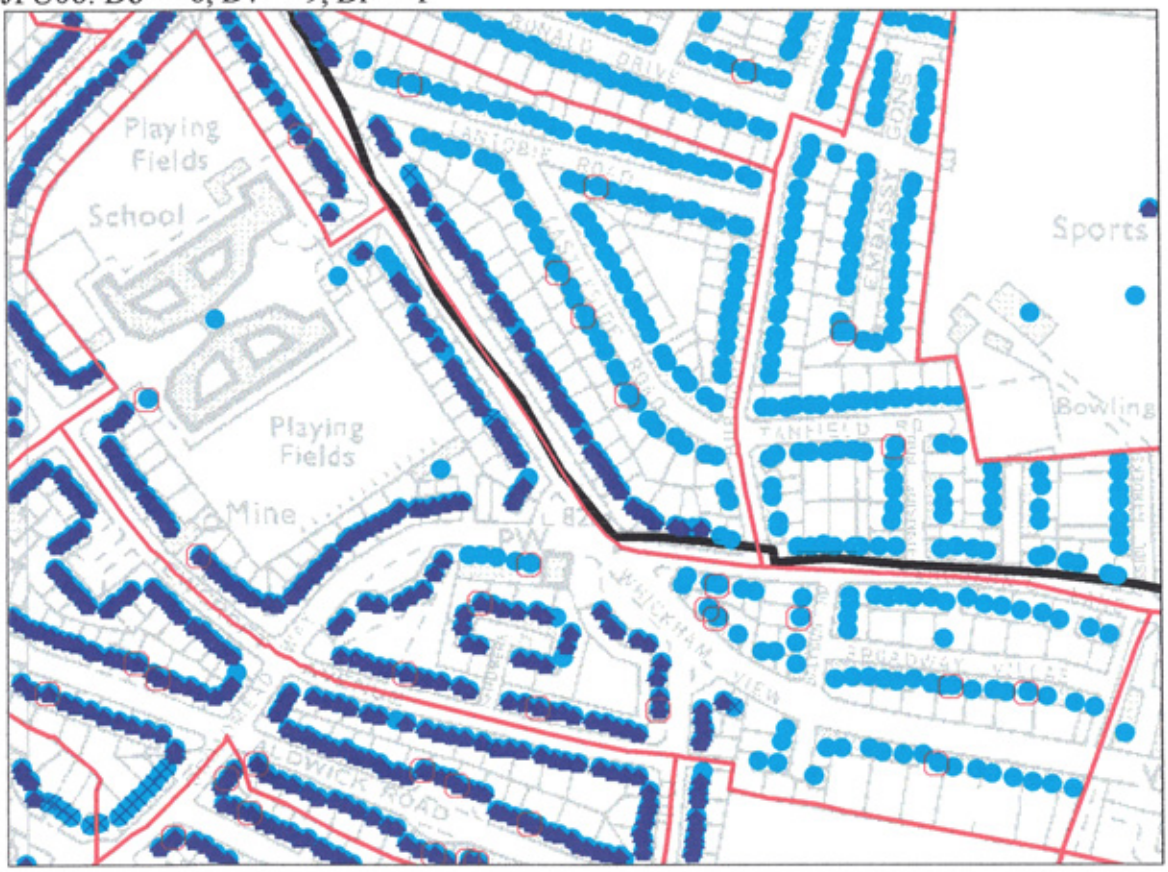
Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	200	Residential addresses	197
			Business	2
			Unknown	2
			Total addresses	201
			Council properties	48
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	46	1991 council stock	48
S610003	Detached	0	Bungalow	1
S610004	Semi Detached	43	House	86
S610005	Terraced	44	No Entry	5
S610006	Flat in res building	112	Flat	108
S610007	Flat in com. building	1	Shop & Prem	1
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	181/180	Residential addresses – All vacancies	201-14 = 197
S620002	Owned outright	23		
S620003	Buying	66		
S620004	Furnished	13		
S620005	Un-furnished	31		
S620006	Rented with a job or business	1		
S620007	Rented from a Housing Association	1		
S620008	Rented from a local authority	46	1991 council stock – local authority vacancies	48 – 0 = 48
S610029 + S610057	Vacant dwellings and 2nd accom	19	All vacancies (Local authority vacancies)	14 (0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	4	House	1
S610033 + S610061	Terraced	0	No Entry	0
S610034 + S610062	Flat in res. building	15	flat	13
S610036 + S610064	Converted Flat	0		0

CJFU07: Do = -6, Dv = 0, Dr = 1



Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	212	Residential addresses	211
			Business	0
			Unknown	0
			Total addresses	211
			Council properties	205
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	193	1991 council stock	205
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	4	House	211
S610005	Terraced	208	No Entry	0
S610006	Flat in res building	0	Flat	0
S610007	Flat in com. building	0		
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	204	Residential addresses – All vacancies	211-6 = 205
S620002	Owned outright	1		
S620003	Buying	5		
S620004	Furnished	2		
S620005	Un-furnished	0		
S620006	Rented with a job or business	2		
S620007	Rented from a Housing Association	2		
S620008	Rented from a local authority	193	1991 council stock – local authority vacancies	205 – 6 = 199
S610029 + S610057	Vacant dwellings and 2nd accom	6	All vacancies (Local authority vacancies)	6 (6)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	0	House	6
S610033 + S610061	Terraced	6	No Entry	0
S610034 + S610062	Flat in res. building	0	flat	0
S610036 + S610064	Converted Flat	0		0

CJFU08: Do = -6, Dv = -9, Dr = -1



Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	212	Residential addresses	213
			Business	14
			Unknown	2
			Total addresses	229
			Council properties	128
			Old council properties	1
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	118	1991 council stock	129
S610003	Detached	5	Bungalow	89
S610004	Semi Detached	59	House	114
S610005	Terraced	141	No Entry	15
S610006	Flat in res building	0	Flat	3
S610007	Flat in com. building	7	Adult Training Cen.	1
S610008	Converted. Flat	0	Store & Office	1
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	207/206	Residential addresses – All vacancies	209-15 = 194
S620002	Owned outright	34		
S620003	Buying	41		
S620004	Furnished	3		
S620005	Un-furnished	4		
S620006	Rented with a job or business	2		
S620007	Rented from a Housing Association	4		
S620008	Rented from a local authority	118	1991 council stock – local authority vacancies	129 – 5 = 124
S610029 + S610057	Vacant dwellings and 2nd accom	6	All vacancies (Local authority vacancies)	15 (5)
	Structure of vacant dwellings			
S610031 + S610059	Detached	1	Bungalow	0
S610032 + S610060	Semi Detached	1	House	0
S610033 + S610061	Terraced	3	No Entry	0
S610034 + S610062	Flat in res. building		flat	1
	Flat in com. building	1		
S610036 + S610064	Converted Flat	0		0

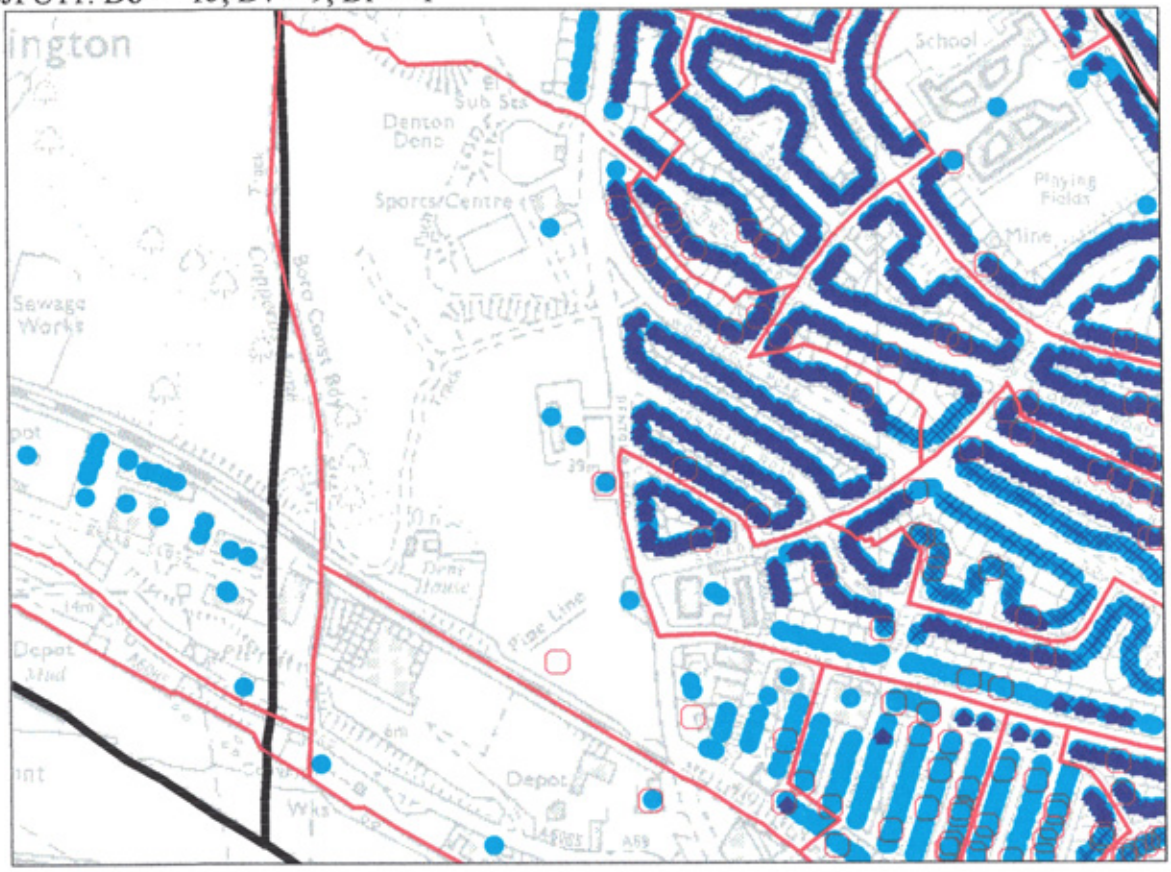
CJFU09: Do = 4, Dv = -3, Dr = 2

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	206	Residential addresses	204
			Business	4
			Unknown	1
			Total addresses	209
			Council properties	55
			Old council properties	1
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	58	1991 council stock	56
S610003	Detached	1	Bungalow	8
S610004	Semi Detached	11	House	31
S610005	Terraced	14	No Entry	6
S610006	Flat in res building	178	Flat	164
S610007	Flat in com. building	2		
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors		Residential addresses – All vacancies	209-4 = 205
S620002	Owned outright	206/205		
S620003	Buying	14		
S620004	Furnished	2		
S620005	Un-furnished	5		
S620006	Rented with a job or business	7		
S620007	Rented from a Housing Association	114		
S620008	Rented from a local authority	58	1991 council stock – local authority vacancies	56 – 2 = 54
S610029 + S610057	Vacant dwellings and 2nd accom	1	All vacancies (Local authority vacancies)	4 (2)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	0	House	1
S610033 + S610061	Terraced	0	No Entry	0
S610034 + S610062	Flat in res. building	1	flat	3
S610036 + S610064	Converted Flat	0		0

CJFU10: Do = -3 ,Dv = -2, Dr = 0

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	205	Residential addresses	206
			Business	1
			Unknown	0
			Total addresses	207
			Council properties	195
			Old council properties	9
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	190	1991 council stock	204
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	5	House	200
S610005	Terraced	199	No Entry	6
S610006	Flat in res building	1	Flat	0
S610007	Flat in com. building	0	Stores Office & Prem.	1
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	196	Residential addresses – All vacancies	207-11 = 196
S620002	Owned outright	0		
S620003	Buying	5		
S620004	Furnished	0		
S620005	Un-furnished	0		
S620006	Rented with a job or business	1		
S620007	Rented from a Housing Association	0		
S620008	Rented from a local authority	190	1991 council stock – local authority vacancies	204 – 11 = 193
S610029 + S610057	Vacant dwellings and 2nd accom	9	All vacancies (Local authority vacancies)	11 (11)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	0	House	10
S610033 + S610061	Terraced	9	No Entry	0
S610034 + S610062	Flat in res. building	0	flat	0
S610036 + S610064	Converted Flat	0		0

CJFU11: Do = -15, Dv = 9, Dr = -1

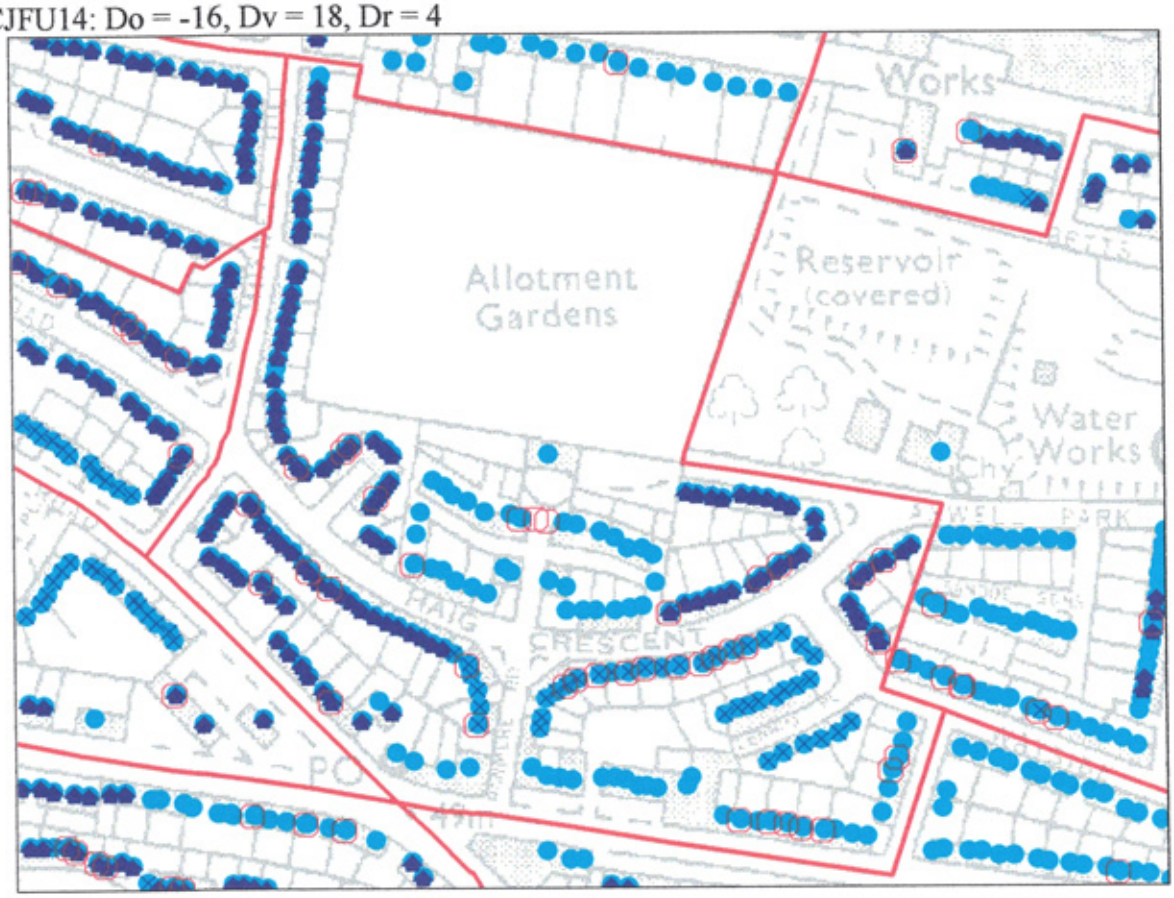


Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	215	Residential addresses	216
			Business	3
			Unknown	1
			Total addresses	220
			Council properties	167
			Old council properties	6
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	150	1991 council stock	173
S610003	Detached	15	Bungalow	0
S610004	Semi Detached	41	House	183
S610005	Terraced	139	No Entry	16
S610006	Flat in res building	0	Flat	20
S610007	Flat in com. building	0	Member's Club & Prem.	1
S610008	Converted. Flat	20		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	193/194	Residential addresses – All vacancies	220-13 = 197
S620002	Owned outright	13		
S620003	Buying	19		
S620004	Furnished	2		
S620005	Un-furnished	2		
S620006	Rented with a job or business	2		
S620007	Rented from a Housing Association	6		
S620008	Rented from a local authority	150	1991 council stock – local authority vacancies	173 – 8 = 165
S610029 + S610057	Vacant dwellings and 2nd accom	22	All vacancies (Local authority vacancies)	13 (8)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	1	House	183
S610033 + S610061	Terraced	14	No Entry	16
S610034 + S610062	Flat in res. building	0	flat	20
	Flat in com. building	1	Members Club & Prem.	1
S610036 + S610064	Converted Flat	6		0

CJFU12: Do = -18, Dv = 21, Dr = 0

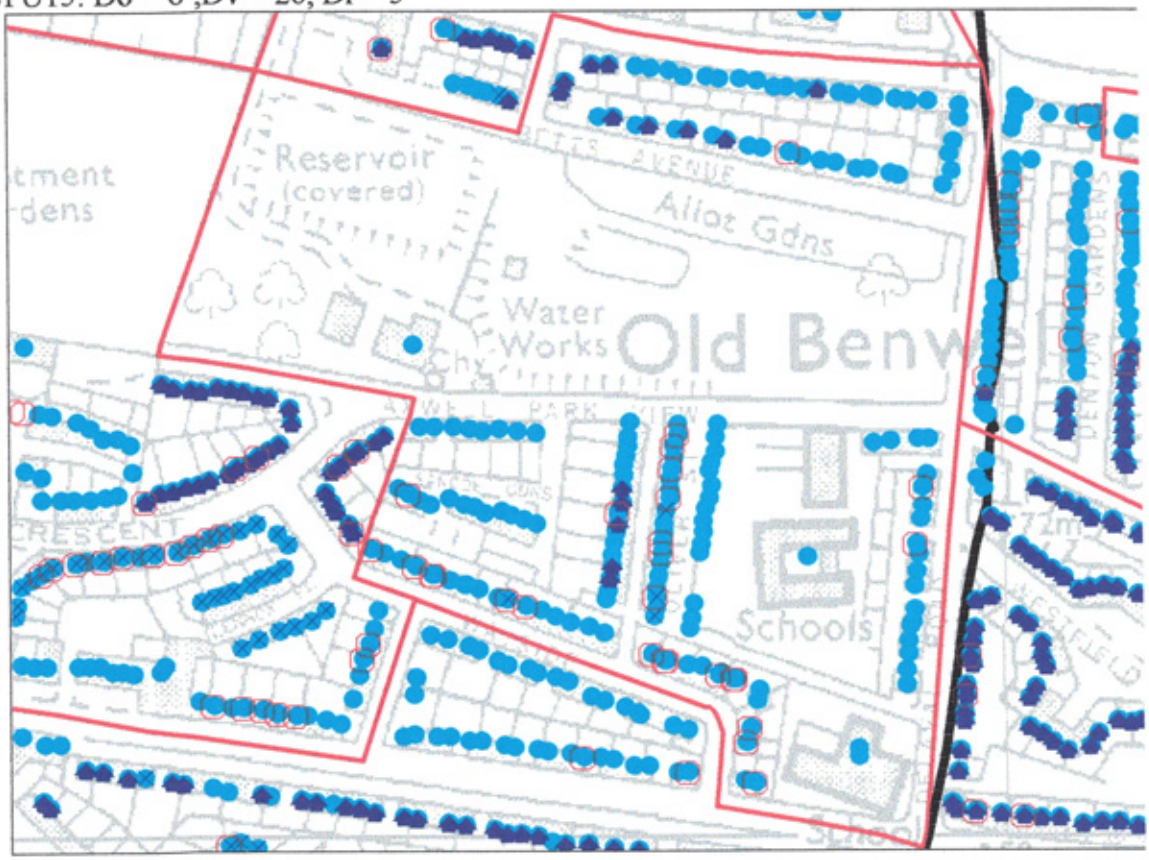
Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	201	Residential addresses	201
			Business	3
			Unknown	0
			Total addresses	204
			Council properties	100
			Old council properties	48
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	126	1991 council stock	148
S610003	Detached	10	Bungalow	0
S610004	Semi Detached	46	House	112
S610005	Terraced	97	No Entry	39
S610006	Flat in res building	45	Flat	52
S610007	Flat in com. building	1	School & Prem.	1
S610008	Converted. Flatlet	1		
S6100013	Shared Dwelling	1		
S610015 + S610071)/S620001	Dwellings with residents or visitors	171/174	Residential addresses – All vacancies	201-7 = 194
S620002	Owned outright	9		
S620003	Buying	16		
S620004	Furnished	13		
S620005	Un-furnished	8		
S620006	Rented with a job or business	2		
S620007	Rented from a Housing Association	0		
S620008	Rented from a local authority	126	1991 council stock – local authority vacancies	148 – 4 = 144
S610029 + S610057	Vacant dwellings and 2nd accom	28	All vacancies (Local authority vacancies)	7 (4)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	0	House	3
S610033 + S610061	Terraced	23	No Entry	0
S610034 + S610062	Flat in res. building	5	flat	4
S610036 + S610064	Converted Flat	0		0

CJFU14: Do = -16, Dv = 18, Dr = 4



Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	219	Residential addresses	215
			Business	17
			Unknown	0
			Total addresses	232
			Council properties	115
			Old council properties	40
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.		1991 council stock	155
S610003	Detached	4	Bungalow	12
S610004	Semi Detached	24	House	160
S610005	Terraced	183	No Entry	54
S610006	Flat in res building	0	Flat	2
S610007	Flat in com. building	0	For cc purposes	2
S610008	Converted. Flat	8	Public House &prem.	1
S6100013	Shared Dwelling	0	Shop & Prem.	1
S610015 + S610071)/S620001	Dwellings with residents or visitors	160/159	Residential addresses – All vacancies	215-40 = 175
S620002	Owned outright	1		
S620003	Buying	6		
S620004	Furnished	2		
S620005	Un-furnished	3		
S620006	Rented with a job or business	0		
S620007	Rented from a Housing Association	35		
S620008	Rented from a local authority	112	1991 council stock – local authority vacancies	155 – 27 = 128
S610029 + S610057	Vacant dwellings and 2nd accom	58	All vacancies (Local authority vacancies)	40 (27)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	1
S610032 + S610060	Semi Detached	5	House	29
S610033 + S610061	Terraced	46	No Entry	6
S610034 + S610062	Flat in res. building	0	flat	2
S610036 + S610064	Converted Flat	7	For cc purposes only	1

CJFU15: Do = 6 ,Dv = 26, Dr = 5



Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	201	Residential addresses	196
			Business	8
			Unknown	35
			Total addresses	239
			Council properties	14
			Old council properties	5
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	22	1991 council stock	19
S610003	Detached	3	Bungalow	0
S610004	Semi Detached	55	House	70
S610005	Terraced	85	No Entry	136
S610006	Flat in res building	56	Flat	30
S610007	Flat in com. building	2	Shop & Premises	3
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	140/141	Residential addresses – All vacancies	196-30 = 166
S620002	Owned outright	29		
S620003	Buying	37		
S620004	Furnished	32		
S620005	Un-furnished	23		
S620006	Rented with a job or business	0		
S620007	Rented from a Housing Association	0		
S620008	Rented from a local authority	22	1991 council stock – local authority vacancies	19 – 3 = 16
S610029 + S610057	Vacant dwellings and 2nd accom	56	All vacancies (Local authority vacancies)	30 (3)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	6	House	2
S610033 + S610061	Terraced	29	No Entry	26
S610034 + S610062	Flat in res. building	21	flat	2
S610036 + S610064	Converted Flat	0		0

CJFU16: Do = 7, Dv = 18, Dr = 9

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	208	Residential addresses	199
			Business	9
			Unknwon	0
			Total addresses	210
			Council properties	13
			Old council properties	0
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	170	1991 council stock	13
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	0	House	43
S610005	Terraced	79	No Entry	21
S610006	Flat in res building	127	Flat	143
S610007	Flat in com. building	0	Shops & Prem.	3
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	168/171	Residential addresses – All vacancies	199-19 = 180
S620002	Owned outright	28		
S620003	Buying	37		
S620004	Furnished	37		
S620005	Un-furnished	27		
S620006	Rented with a job or business	1		
S620007	Rented from a Housing Association	21		
S620008	Rented from a local authority	20	1991 council stock – local authority vacancies	13 – 0 = 13
S610029 + S610057	Vacant dwellings and 2nd accom	37	All vacancies (Local authority vacancies)	19 (0)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	0	House	3
S610033 + S610061	Terraced	2	No Entry	0
S610034 + S610062	Flat in res. building	29	flat	16
	Flat in com. building	6		
S610036 + S610064	Converted Flat	0		

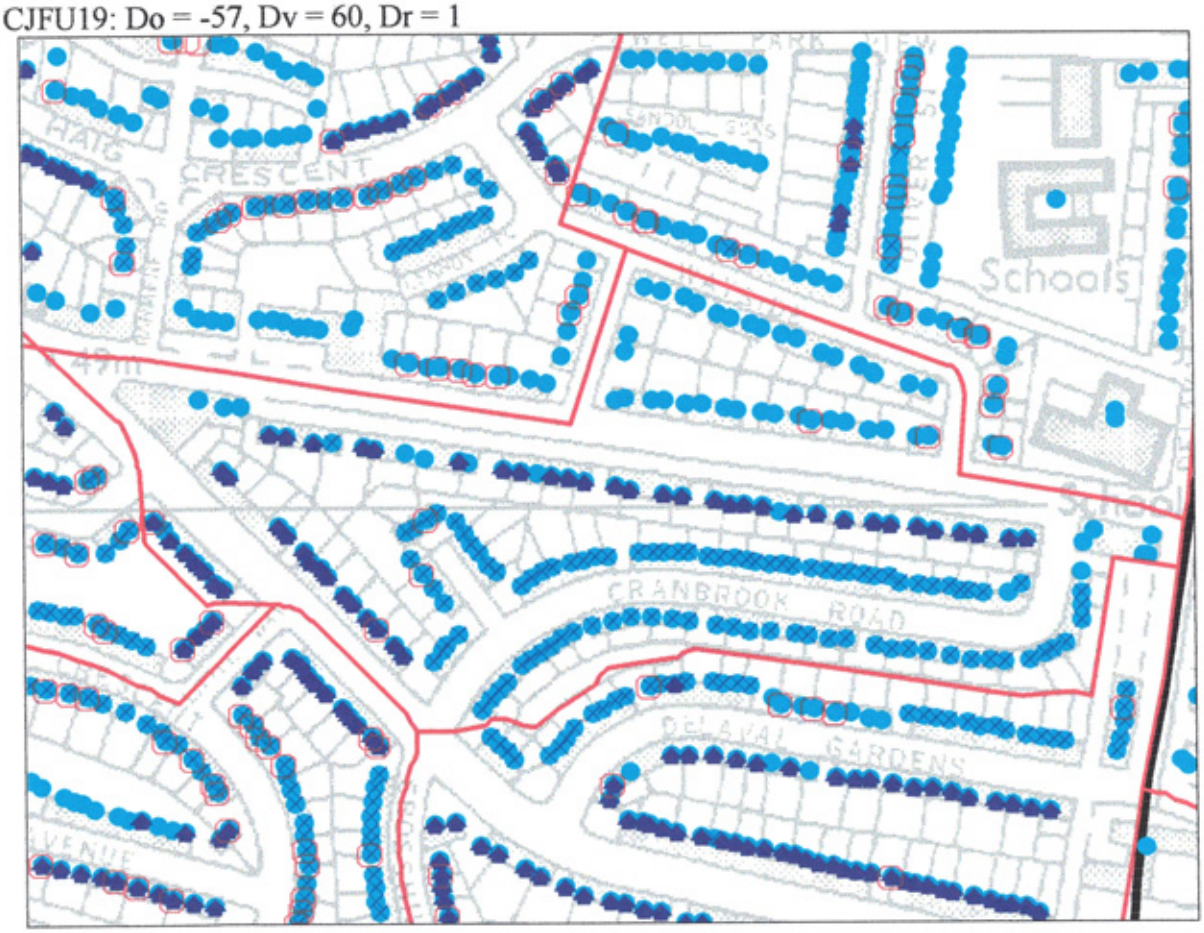
CJFU17: Do = 3, Dv = 28, Dr = -3

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	194	Residential addresses	197
			Business	4
			Unknown	2
			Total addresses	203
			Council properties	17
			Old council properties	16
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.		1991 council stock	33
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	8	House	37
S610005	Terraced	35	No Entry	16
S610006	Flat in res building	120	Flat	149
S610007	Flat in com. building	31	Misc. Domestic	1
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	135/139	Residential addresses – All vacancies	197-28= 169
S620002	Owned outright	14	108	169-28 = 141 Non-LA occupied
S620003	Buying	15		
S620004	Furnished	41		
S620005	Un-furnished	21		
S620006	Rented with a job or business	0		
S620007	Rented from a Housing Association	17		
S620008	Rented from a local authority	31	1991 council stock – local authority vacancies	33 – 5 = 28
S610029 + S610057	Vacant dwellings and 2nd accom	56	All vacancies (Local authority vacancies)	28 (5)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	6	House	6
S610033 + S610061	Terraced	2	No Entry	1
S610034 + S610062	Flat in res. building	48	flat	21
S610036 + S610064	Converted Flat	0		0

CJFU18: Do = -8, Dv = 7, Dr = -1

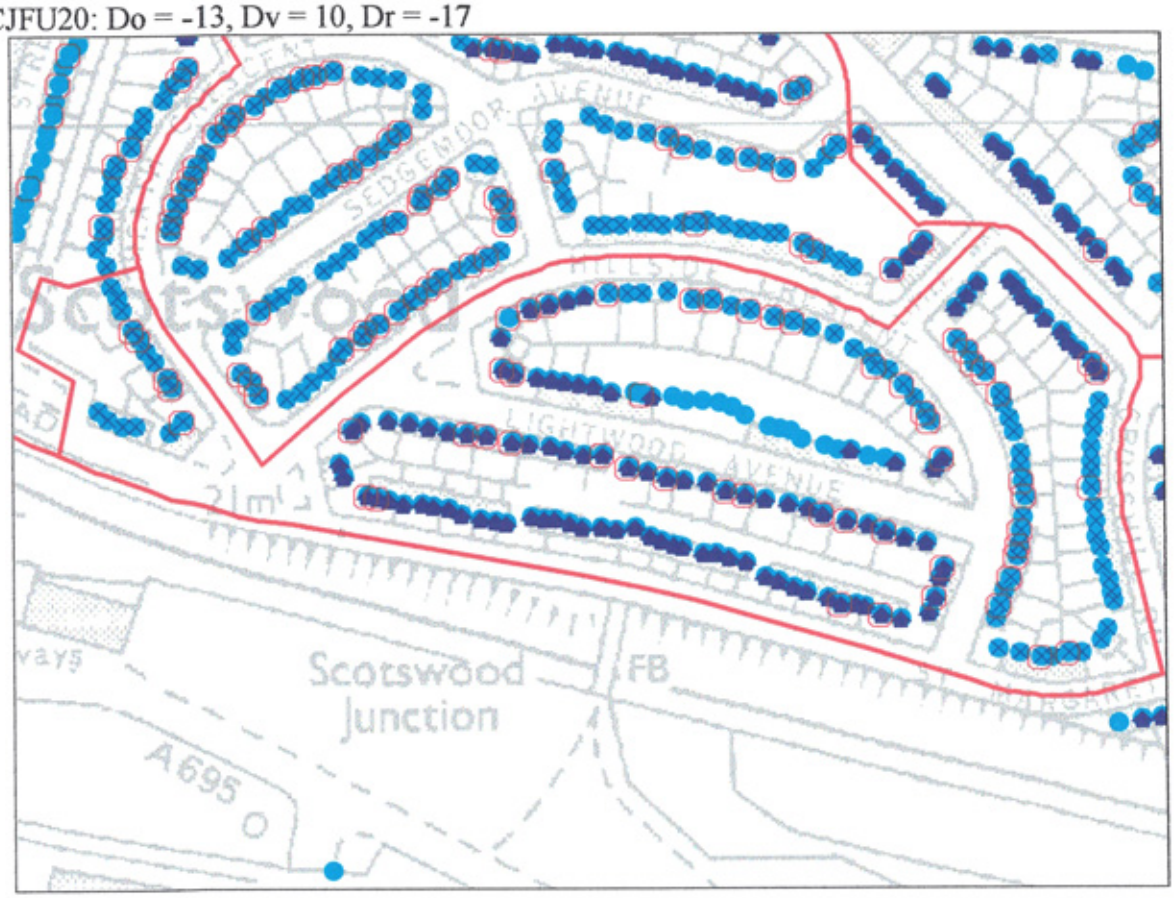
Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	209	Residential addresses	210
			Business	3
			Unknown	0
			Total addresses	213
			Council properties	61
			Old council properties	127
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.		1991 council stock	188
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	31	House	140
S610005	Terraced	160	No Entry	63
S610006	Flat in res building	0	Flat	10
S610007	Flat in com. building	3		
S610008	Converted. Flat	15		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	133/134	Residential addresses – All vacancies	210-68 = 142
S620002	Owned outright	4	18	142-124 = 18 Non-LA occupied
S620003	Buying	5		
S620004	Furnished	6		
S620005	Un-furnished	0		
S620006	Rented with a job or business	0		
S620007	Rented from a Housing Association	3		
S620008	Rented from a local authority	116	1991 council stock – local authority vacancies	188 – 64 = 124
S610029 + S610057	Vacant dwellings and 2nd accom	75	All vacancies (Local authority vacancies)	68 (64)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	3	House	51
S610033 + S610061	Terraced	64	No Entry	16
S610034 + S610062	Flat in res. building	0	flat	1
	Flat in com. building	3		
S610036 + S610064	Converted Flat	5		0

CJFU19: Do = -57, Dv = 60, Dr = 1



Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	204	Residential addresses	203
			Business	6
			Unknown	1
			Total addresses	210
			Council properties	51
			Old council properties	96
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.		1991 council stock	147
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	69	House	86
S610005	Terraced	116	No Entry	104
S610006	Flat in res building	14	Flat	17
S610007	Flat in com. building	5	Shop & Prem.	3
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	137	Residential addresses – All vacancies	203-6 = 197
S620002	Owned outright	12		
S620003	Buying	16		
S620004	Furnished	18		
S620005	Un-furnished	1		
S620006	Rented with a job or business	3		
S620007	Rented from a Housing Association	1		
S620008	Rented from a local authority	86	1991 council stock – local authority vacancies	147 – 4 = 143
S610029 + S610057	Vacant dwellings and 2nd accom	66	All vacancies (Local authority vacancies)	6 (4)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	7	House	3
S610033 + S610061	Terraced	57	No Entry	3
S610034 + S610062	Flat in res. building	2	flat	0
S610036 + S610064	Converted Flat	0		0

CJFU20: Do = -13, Dv = 10, Dr = -17



Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	182	Residential addresses	199
			Business	0
			Unknown	0
			Total addresses	199
			Council properties	104
			Old council properties	78
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.		1991 council stock	182
S610003	Detached	1	Bungalow	0
S610004	Semi Detached	23	House	132
S610005	Terraced	158	No Entry	67
S610006	Flat in res building	0	Flat	0
S610007	Flat in com. building	0		
S610008	Converted. Flat	0		
S6100013	Shared Dwelling	0		
S610015 + S610071)/S620001	Dwellings with residents or visitors	113/114	Residential addresses – All vacancies	199-57 = 142
S620002	Owned outright	0		
S620003	Buying	0		
S620004	Furnished	1		
S620005	Un-furnished	0		
S620006	Rented with a job or business	2		
S620007	Rented from a Housing Association	2		
S620008	Rented from a local authority	114	1991 council stock – local authority vacancies	182 – 55 = 137
S610029 + S610057	Vacant dwellings and 2nd accom	67	All vacancies (Local authority vacancies)	57 (55)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	6	House	32
S610033 + S610061	Terraced	61	No Entry	25
S610034 + S610062	Flat in res. building	0	flat	0
S610036 + S610064	Converted Flat	0		0

CJFU21: Do = -9, Dv = -2, Dr = -4

Census table and cell number	Census variable	No. of Dwellings	Local authority variable	No. of Addresses
S610001	Total residential dwellings	192	Residential addresses	196
			Business	25
			Unknown	0
			Total addresses	222
			Council properties	133
			Old council properties	51
	Structure of all dwellings (SAS61) vacant, occupied, 2nd accom.	147	1991 council stock	184
S610003	Detached	0	Bungalow	0
S610004	Semi Detached	48	House	137
S610005	Terraced	144	No Entry	71
S610006	Flat in res building	0	Flat	4
S610007	Flat in com. building	0	Maisonnettes	8
S610008	Converted. Flat	0	Offices & Stores	1
S6100013	Shared Dwelling	0	Public House & Prem.	1
S610015 + S610071)/S620001	Dwellings with residents or visitors	164/162	Residential addresses – All vacancies	196-32 = 164
S620002	Owned outright	3		
S620003	Buying	3		
S620004	Furnished	2		
S620005	Un-furnished	0		
S620006	Rented with a job or business	4		
S620007	Rented from a Housing Association	3		
S620008	Rented from a local authority	147	1991 council stock – local authority vacancies	184 – 28 = 156
S610029 + S610057	Vacant dwellings and 2nd accom	30	All vacancies (Local authority vacancies)	32 (28)
	Structure of vacant dwellings			
S610031 + S610059	Detached	0	Bungalow	0
S610032 + S610060	Semi Detached	13	House	25
S610033 + S610061	Terraced	17	No Entry	4
S610034 + S610062	Flat in res. building	0	flat	0
S610036 + S610064	Converted Flat	0	Maisonnette	2
			Public House & Prem	1

APPENDIX 8 - Structure of table SAS03 - Communal Establishments

1991 Census Local Base Statistics - 100% Area Identifier - Grid reference -
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Table L03 Communal establishments: Establishments; Persons present not in households

Type of establishment	Number of establish-ments*	TOTAL PERSONS	Total males	Total females	Residents								
					Not resident			Staff			Other residents		
					Total	Males	Females	Total	Males	Females	Total	Males	Females
All establishments	1	2	3	4	5	6	7	8	9	10	11	12	13
Medical and care sector	14	15	16	17	18	19	20	21	22	23	24	25	26
NHS hosp./homes - psychiatric	27	28	29	30	31	32	33	34	35	36	37	38	39
NHS hosp./homes - other	40	41	42	43	44	45	46	47	48	49	50	51	52
Non-NHS hospitals - psychiatric	53	54	55	56	57	58	59	60	61	62	63	64	65
Non-NHS hospitals - other	66	67	68	69	70	71	72	73	74	75	76	77	78
Local authority homes	79	80	81	82	83	84	85	86	87	88	89	90	91
Housing association homes and hostels	92	93	94	95	96	97	98	99	100	101	102	103	104
Nursing homes (Non-NHS/LA/HA)	105	106	107	108	109	110	111	112	113	114	115	116	117
Residential homes (Non-NHS/LA/HA)	118	119	120	121	122	123	124	125	126	127	128	129	130
Children's homes	131	132	133	134	135	136	137	138	139	140	141	142	143
Detention, defence, and education	144	145	146	147	148	149	150	151	152	153	154	155	156
Prison service establishment	157	158	159	160	161	162	163	164	165	166	167	168	169
Defence establishment	170	171	172	173	174	175	176	xxxx	xxxx	xxxx	180	181	182
Educational establishment	183	184	185	186	187	188	189	190	191	192	193	194	195
Other groups	196	197	198	199	200	201	202	203	204	205	206	207	208
Hotels, boarding houses, etc	209	210	211	212	213	214	215	216	217	218	219	220	221
Hostels and common lodging houses (Non-HA)	222	223	224	225	226	227	228	229	230	231	232	233	234
Other misc. estab.	235	236	237	238	239	240	241	242	243	244	245	246	247
Persons sleeping rough	xxxx	249	250	251	252	253	254	xxxx	xxxx	xxxx	258	259	260
Campers	xxxx	262	263	264	265	266	267	xxxx	xxxx	xxxx	271	272	273
Civilian ships, boats and barges	274	275	276	277	278	279	280	xxxx	xxxx	xxxx	284	285	286

*The counts in this column are unmodified

Table A8.1 Structure of table SAS03 – Communal establishments: Establishments; Persons present not in households

APPENDIX 9 - Central and Local government finance

The Central Government's annual forecasts of local government spending for the provision of a level of service is known as the Total Standard Spending (TSS). A large part of TSS is met by the Government's distribution of grants (Revenue Support Grant[14], certain specific[15] and special grants[16]) and business rates. This income is collectively known as the 'Aggregate External Finance'. The difference between Total Standard Spending and Aggregate External Finance is the approximate amount local authorities would need to raise through Council Tax if they spent at the level of Total Standard Spending (DETR, 1998b). The annual central government assessment of each local authority is determined by means of Standard Spending Assessment (SSA).

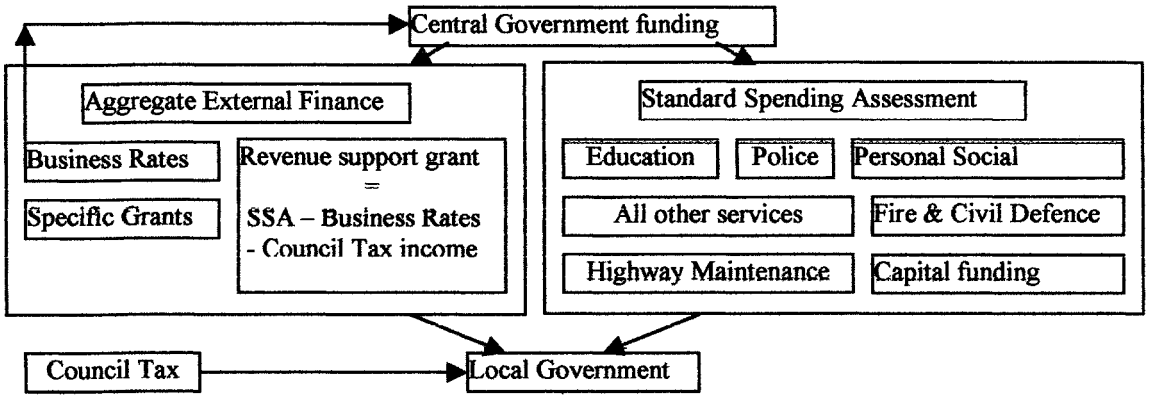

Figure A9. 1 Central and Local government finance

This is the government's view of expenditure by a local authority for the provision of a standard level of service and takes into account the social, demographic and geographic characteristics of the authority's area (Audit Commission[17], 1993).

[14] A Government grant making up the shortfall between local authorities' SSA and the income received through Council Tax and business rates.
[15] Grants made available for specific purposes and they can be spent only for a particular purpose.
[16] Grants which must be debated and approved by Parliament.
[17] Audit commission was established by the 1982 Local Government Act, to examine performance amongst local authorities and to make recommendations highlighting best local practice in achieving economy, efficiency and effectiveness.

APPENDIX 10 - Selection of indicators in the EwC project

Census day to mid-year timing adjustment

This was the allocation of OPCS's district timing adjustments to sub-district areas, at each age and sex group, pro-rata to the total residents from SAS02. The district timing adjustment was the sum of estimated effects of ageing, births, deaths and migration in the period between the time of the Census (21st April 1991) and 30th June 1991. Local indicators of Ward population change were not sought due to the small size of the district adjustment (Simpson *et al.*, 1995).

The armed forces non-response adjustment

The district adjustments included armed forces and their dependants, categorised using the national age-structure. The indicator used to distribute this adjustment was from table SAS92, 'Armed forces residents enumerated' for Wards where the armed forces non-response was greater than 15% of the total estimated armed forces population. In Wards with smaller non-response rates, the remaining district adjustment was distributed pro-rata to the number of armed forces present on bases taken from table SAS03 (Simpson *et al.*, 1995).

Data modification adjustment

The figures in Census SAS tables were modified to avoid breach of confidentiality, by the addition of 0, +1 or -1 to counts (OPCS/GRO(S), 1991b). The exceptions to this were the counts of all residents, households, communal establishments and the counts in table SAS71 (comparison of 100% and 10% counts). The addition of sub-district SAS figures in a particular district therefore, did not always equate the District LBS figures. This resulted in differences between the EwC sub-district adjustments, and the OPCS district adjustment figures. A pro-rata allocation of the difference was therefore made to the individual EDs, which ensured that the District adjustments calculated by the EwC matched those by the OPCS (Simpson *et al.*, 1995).

APPENDIX 11 - Interpretation of datasets

The contents of datasets were examined in order to establish the council stock figure around the time of the 1991 Census. This information also helped explain the observed differences in the final stages of the analysis. It was found that the EoT (end of tenancy agreement) dates could be used to obtain a best estimate of the number of properties demolished/disposed after the Census. These were added to the 1995 council stock to reconstruct the 1991 council stock figure. An alternative method of reconstructing the 1991 council stock was the use of the LPG Gazetteer, which held tenure information for all residential properties. This however, was found to be out of date due to data maintenance problems outlined in Chapter 3 (Section 3.2.2). The number of local authority rented properties in this Gazetteer (51059) was far more than those in the council properties database (39158) and the 1990/91 Housing Annual Report (42210).

Investigation of the contents of the old properties database

The contents of the old properties database were examined by understanding the sequence of events, starting from the approval of demolition plans by the Housing Committee to the actual demolition of properties. This helped ascertain whether the properties were standing on Census night. It is acknowledged that a comprehensive understanding of the processes resulting in the existence of databases and any interpretation of their content is to some degree, subject to uncertainties. The old properties database, which contained (3600) records of demolished/disposed council properties since 1990, was examined to determine the proportion of these that were to be included in the 1991 council stock count. The 1991 council stock figure (41550) was calculated as the sum of demolished/disposed council properties since the Census (2392), and the 1995 council housing stock (39158). It was decided that from the total number of demolished/disposed council properties (3600), only those with EoT dates after Census night (2419) should be selected. The EoT dates were considered as a close approximation of the demolition dates. The selected records were reduced to 2392, which excluded duplicate records in the council properties database (13), garage sites (11) and those without grid co-ordinates (3). In addition to addresses, each record included codes to distinguish between the methods of disposal, date, the scheme under which the authority disposed of the property and the CPM property

ID number (Appendix 2). The dates in this database related to the end of tenancy (EoT) agreements of tenants and originated from the housing mainframe system. These were entered by staff at the Debit Control section of the authority, responsible for rent collection (Ryan, 2000). When the decision to demolish properties was approved by the Housing Committee, the records of these properties were downloaded from the housing mainframe by the Housing Renewal Section and maintained separately in the 'Old properties' database. These records were also excluded from databases in the HPIS system and were no longer included in internal reports and council stock lists. The actual demolition of properties took place sometime after the EoT date. The exact date of which however, could not be traced as this task was carried out by agencies, sub-contracted by the local authority. Although the decision to demolish a group of addresses under a particular scheme was approved by the Housing Committee at the same time, there were different dates associated with records of such properties. This occurred in cases where a particular scheme was phased over a number of years and the dates referred to various EoT agreements. The tenants vacated such properties any time up to the end of their tenancy agreements. Some properties therefore remained vacant (awaiting demolition) for a period of time until their EoT dates. Although these properties were excluded from council stock lists and other internal reports, they would have continued to be local authority owned until the end of tenancy agreements.

Explanation of EoT dates: Joining old properties and council properties databases

The implications of using EoT dates for the selection of records (from the old properties database) were further studied. The old properties database was joined to the council properties database using the CPM property ID number. Records of 24 demolished/disposed council properties (Table A11.1) with EoT dates after November 95, were expected to be present in the council properties database. Half of these records were not found in the council properties database as expected because their demolition plans had been approved before the EoT date. This information was provided by the Housing Annual reports and internal departmental records outlined in the following section. The comparison of records within the two databases therefore, suggested that the EoT dates did not coincide with demolition dates of the properties.

No of Adds	Street Name	Housing Annual Reports	Housing Committee's Decision date	Date the property was excluded from stock from the manual records	EoT Date in Old Properties database	Old Property Scheme Name	Area/scheme in manual records
6	**Britannia Place**	**93/94**	**Before Nov 95**	**95/96 demolished**	**23/01/96**		**Jubilee Remodelling with Two Castles HA Elswick/Jubilee**
1	Fairholm Road		After Nov 95	95/96 demolished through conversion	13/12/95	Additional Accommodation	Elswick/North Benwell Miscellaneous
4	Broadmead Way	92/93	After Nov 95	95/96 demolish	29/12/95	Ferguson's Lane	Scotswood/Broadmead Way
2	**Delaval Gardens**	**92/93**	**Before Nov 95; Before March 95**	**94/95 demolish; 95/96 pending demol**	**10/01/96**	**Improved for sale**	**Scotswood/Delaval Delaval Gardens**
1	Delaval Gardens	92/93	After Nov 95	95/96 demolish	10/01/96	Improved for sale	Scotswood/Delaval Delaval Gardens and Rd remainder
1	**Delaval Gardens**	**92/93**	**Before Nov 95; Before March 95**	**94/95 demolish; 95/96 pending demol**	**10/01/96**	**Improved for sale**	**Scotswood/Delaval Delaval Gardens**
1	Delaval Road	92/93	After Nov 95	95/96 demolished	10/01/96	Benwell Dene	Scotswood/Delaval Delaval Gardens and Rd remainder
2	**Wayside**	**92/93**	**Before Nov 95; Before March 95**	**94/95 Pending demolition; 95/96 demolished**	**13/12/95**	**Improved for sale**	**Scotswood**
1	Eastgarth		After Nov 95	95/96 demolition through conversion	20/12/95	Newbiggin Hall	Woolsington/Newbiggin Hall Miscellaneous
1	Milford Road		After Nov 95	95/96 demolished	10/01/96	Benwell Dene	Benwell/Upper Delaval Milford Rd/Westfield Rd
2	Westfield Road		After Nov 95	95/96 demolished	10/01/96	Benwell Dene	Benwell/Upper Delaval Milford Rd/Westfield Rd
1	**Pandon Court**		**Before Nov 95**	**95/96 demolished**	**09/01/96**	**Improved for sale**	**Sandyford/Sheildfield Multis**
1	Pandon Court		After Nov 95	95/96 demolished through conversion	09/01/96	Sheildfield	Sandyford/Sheildfield Converted to concierge Lort Pandon, King's Charles concierge

Table A11.1 Properties found in both council properties database and old properties database with EoT dates after November 1995

According to the 92/93 Housing Annual Report, the Scotswood Renewal area (jointly funded by the City Challenge Regeneration Scheme and Newcastle City Council) was declared in December 1993. Around the same time, the Housing Committee was requested to approve the demolition of a number of derelict properties in this area. These included properties in Broadmead Way, Delaval Gardens, Delaval Road and Wayside. Properties in Brittannia Place were amongst the properties demolished under the Jubilee remodelling scheme (carried out by the City Council and Two Castles Housing Association), which was launched during 93/94.

Explanation of EoT dates: Using Housing Annual reports and manual records

Information about the schemes under which council properties were disposed or demolished were traced in the Housing Annual reports and lists of demolished

properties from the Housing Renewal section [18]. These provided the annual breakdown of demolished/disposed council properties from 1990 to 1995 and listed records of such properties for 1995/96 financial year. These confirmed that the period of time lapsed between the approval of demolition plans by the Housing Committee and the EoT dates varied. In some cases demolition plans were approved and properties were demolished shortly after (1 to 3 months). Hence, the EoT dates were close approximations of the demolition dates. In other cases, properties were excluded from the council stock list but were left vacant until their EoT dates. This was sometimes up to 2 years due to the phased nature of the demolition plans. In the case of these properties therefore, the EoT dates were not close approximations of the demolition dates. There could be no generalisations made therefore about the sequence of events leading to the demolition of properties or the time period between these events. The EoT dates were used to select and include demolished council properties in the final 1991 council stock count. As such, the changing lapsed period between the exclusion and demolition of properties would have contributed to the observed differences between the Census and local authority stock counts.

Explanation of EoT dates: Joining old properties and vacant properties databases

The 1991 vacant properties database was joined to the old properties database using the CPM property ID number. This identified previous council properties (617) vacant at the time of the Census and established whether the 1991 vacant properties database had correctly identified vacancies on Census night. Joining these databases also provided further information about EoT dates. Records of previous council properties which were found in the 1991 vacant properties database, consisted of two groups of properties with EoT dates before (166) and after Census night (145). Those found with EoT dates before the Census (Table A11.2), suggested that following the end of their tenancy agreements (between 12/01/90 to 14/03/91), they were left vacant, until Census night. Properties with EoT dates after the Census, were vacant on that night and remained as such until their tenancy agreements ended (between 16/05/91 to 23/01/96). Joining the old properties and the 1991 vacant properties databases therefore, established that tenants of properties marked for demolition could have vacated the properties before or after the end of tenancy agreements, depending on the

[18] Internal Memorandum from Director of Housing to Director of Development – 7th November 1995

authority's plans for the demolitions. An alternative explanation for finding records of vacant properties with EoT dates before the Census, was inconsistent data maintenance procedures between the Housing Mainframe and the Community Charge system (Ryan, 2000, personal communication). Inconsistencies between the Housing HPIS system and the Community Charge system occurred because the latter was concerned with individuals rather than properties. When properties were marked for demolition and excluded from the council housing stock (by the Housing Department), the individual's records, including the address would remain on the Community Charge system. Efforts to overcome this problem were in progress. Specific information about demolished/disposed council properties, vacant on Census night and with EoT dates before the Census (166) were obtained from the Housing Annual reports. This was to provided further information about the EoT dates and establish whether they were standing on Census night. The properties consisted of those marked for demolition (139 with EoT dates between 19/01/90 and 16/01/91), sold or transferred to housing associations (27 with EoT dates between 12/01/90 and 14/03/91). Properties due for demolition (139), consisted of 71 addresses in Eastgarth and 68 addresses in North Kenton, Bentinck Street, Cowgate, Sheildfield, Cruddas Park and Rye Hill.

No of Adds	Housing Neighbour-hood	Street Name	Area	Scheme Name	EoT Date:	Date excluded: manual records/HA	Area/ scheme: manual records
24	North Kenton	Harwood Green		Kenton North	23/03/90	HA 89/90 conversion to 2-storey houses	
11	North Kenton	Hillsview Avenue		Kenton North	02/05/90	1990/1991	Fawdon/ North Kenton
5	Elswick	Hull Street		Bentinck Street	30/04/90		Elswick
2	Elswick	Mill Lane		Bentinck Street	16/02/90		Elswick
6	Elswick	Portland Street		Bentinck Street – 21/27 Improved for sale	02/08/90 , 08/08/90 24/09/90 , 27/11/90		Elswick
1	Cowgate	Rose Terrace		Cowgate	08/03/90	25 in 89/90 – 40 in 90/91	Kenton/ Cowgate
1	Cowgate	Whitethorn Crescent		Cowgate	19/01/90	25 in 89/90 – 40 in 90/91	Kenton/ Cowgate
1	Shieldfield	Shieldfield House	2-4 Barker Street	Shieldfield	08/11/90		
3	Cruddas Park	The Beeches	Clumber Street	Cruddus Park	10/05/90		
3	Cruddas Park	The Hawthorns	Park Road	Cruddus Park	10/05/90		
2	Cruddas Park	The Willows	Clumber Street	Cruddus Park	10/05/90		
2	Cruddas Park	Haughton Court	Brunel Terrace	Improved for sale	16/01/91		
3	Cruddas Park	Kings Meadows		Improved for sale	16/01/91		
4	Cruddas Park	Wentworth Court		Rye Hill	26/01/90 , 12/07/90 31/07/90	Prior to 1990	West City/Rye Hill Central
71	Newbiggin Hall	Eastgarth		Newbiggin Hall	26/01/90, 15/03/90 18/05/90, 22/06/90 03/07/90	Prior to 1989	Woolsington/Eastgarth - Greendyke

Table A11.2 Previously owned council properties found vacant on Census night, with EoT dates before the 1991 Census

The EoT dates of some properties due for demolition did not always coincide with the dates provided in the Housing Department's manual records. For example, some properties in Wentworth court, which had EoT dates in 1990/91 were included in the Housing Department's 1989/90 demolition records.

North Kenton: Harwood Green, Hillsview Avenue

According to the 1989/90 Housing Annual Report, addresses in North Kenton (Hillsview Avenue and Harwood Green) were maisonette blocks that were in the progress of being converted to 2-storey family houses. These conversions were near completion around the end of March 1990. The EoT dates associated with these addresses were around the same time (March and May 1990), hence confirming that these properties had already been converted before the Census. Further confirmation was the absence of these properties in the manual records of demolished properties between 1990 and 1996. The existence of these addresses in the 1991 vacancy database was therefore attributed to inconsistent computer records. Community Charge records of residents in these properties were maintained after the conversions.

Elswick: Hull Street, Mill Lane, Portland Street

These addresses were converted as part a modernisation scheme on the Bentinck Estate in Elswick. The second phase of this scheme had started during 1989/90, and the final phase was underway around the end of 1990/91 through to 1991/92. The scheme was to convert a mixture of property types ranging from 6-bedroom houses to a 1-bedroom disabled persons flats. Comparing records in the council properties and old properties database, confirmed that after the conversions, records of these properties were maintained by the Housing Department, using different addresses (house numbers). The EoT dates associated with these addresses were between February and November 1990 (89/90 & 90/91 financial years), which corresponded to the phased nature of the scheme under which they were modernised. Again, inconsistent maintenance procedures between the Community Charge system and the Housing mainframe, was the reason for these properties to appear as vacant in the 1991 vacancy database. The exclusion of these properties from the 1991 council stock count using the EoT dates, was therefore justified.

Cowgate: Rose Terrace, Whitethorn Crescent

Proposals for the Cowgate Renewal Project during 1989/90 were developed by the City Council, two Housing Associations, the Housing Corporation and Lovell Urban Renewal. This was to carry out improvements to 472 properties on the Cowgate Estate. This project started during 1990 and was planned to continue for three or four years (1989/90 Housing Annual Report). During 1990/91, some properties were demolished, new houses were constructed by the North British Housing Association (1990/91 Housing Annual report) and a number of local authority owned properties were transferred to housing associations and private developers. Comparison of property records in Rose Terrace and Whitethorn Crescent in the old properties, council properties and 1991 vacant properties databases, confirmed that the tenancy contracts had ended in January and March 1990 (89/90). According to the manual records, 25 addresses were demolished prior to 1989/90. These were identified using the old properties database and included addresses in Whitethorn Crescent and Rose Terrace. This confirmed that these had already been demolished before the Census night but their records remained on the Community Charge system as the residents' account remained open until 1992.

Shieldfield: Shieldfield House

Only one address from the total of 128 addresses in this 28 storey building, appeared as demolished in the old properties database (EoT date: November 1990) but also in the 1991 vacant property database. In 1989/90, major repair work had started on a number of multi-storey flats around the city and had continued at Sheildfield house during 1990/91. According to the 1991 vacancy database, a standard account was associated with this address between May 1990 and March 93 (when the Community Charge was abolished). This suggested that the Community Charge system was updated to acknowledge the renovations carried out at this address. The old properties database identified this address as demolished after the end of tenancy agreement in November 1990. The 1990-1996 manual records of demolished properties however did not include this address as expected. It was therefore concluded that on Census night this property would no longer have been considered as council stock.

Cruddas Park: The Beeches, The Hawthorns, The Willows, Haughton Court, Kings Meadows, Wentworth Court

The old properties database confirmed that the tenancy agreements associated with these properties ended between January 1990 and January 1991. Addresses in Wentworth Court (EoT dates between January and July 1990) appeared in the 1991 vacancy database, as vacant on Census night. Manual records confirmed these as awaiting demolition, which were excluded from the Housing Department's records prior to 1990. This was carried out as part of the remodelling scheme in Rye Hill estate 'to reduce density, eliminate the deck access walkways and provide gardens' (1989/90 Housing Annual Report) and was completed in 1990/91. Addresses in the multi-storey blocks (The Beeches, The Hawthorns, The Willows, Haughton Court and Kings Meadows) with EoT dates between May 1990 and January 1991, were demolished as part of the physical improvements to communal entrances of these buildings (1990/91 Housing Annual report). It was concluded therefore that records of these addresses remained on the Community Charge system due to inconsistent data maintenance procedures between this and the Housing Mainframe system.

Newbiggin Hall: Eastgarth

The list of demolished properties from 1990 to 1996, identified 71 addresses in Eastgarth as demolished prior to 1989. This was as part of the Greendyke Court scheme. The EoT dates associated with these properties ranged from January to July 1990. The Housing Annual reports confirmed that these were addresses demolished prior to the construction of a number of flats, houses and maisonettes in Greendyke court. Records of these properties had therefore been correctly identified and excluded from the final 1991 council stock count, using the EoT dates in the old properties database.

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